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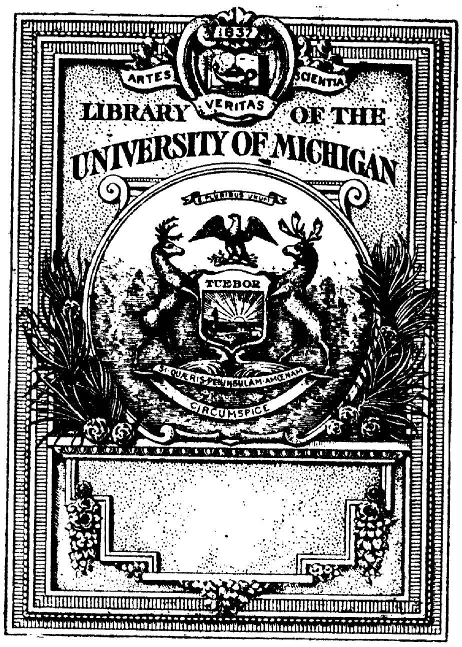
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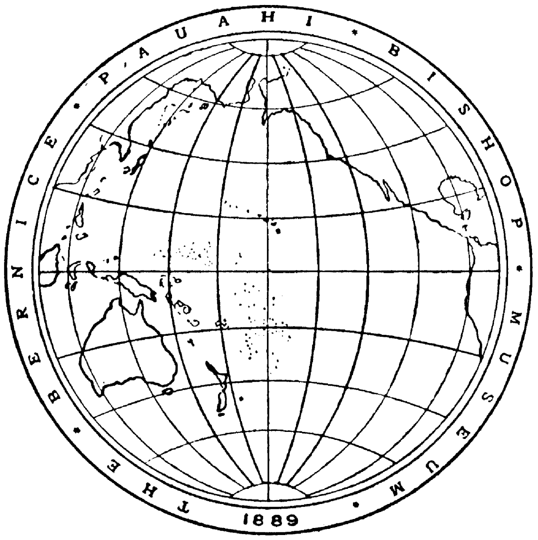
VOLUME II.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By William T. Brigham.
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MEMOIRS

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AND

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VOL. II. No. 1.

Hawaiian Mat and Basket Weaving, and Nets and Netting.

HONOLULU, H. I.:
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1906.

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139. Halemaumau from Northwest. Perkins 591
140. Halemaumau Before the Break. Thrum 592
141. Halemaumau, August, 1909. Reed 593
142. Section of Fire Pit. Baldwin 595
143. Lydgate's Survey of Halemaumau 597

Mat and Basket Weaving of the old Hawaiians, with illustrations of similar work from other parts of the Pacific. *By* WILLIAM T. BRIGHAM, *Director of the Bernice Pauahi Bishop Museum.*

IN this essay I shall endeavor to show the Mat and Basket Work of the Hawaiians, carrying the study of the textile work into the netting, of which the people made great use, not only for fishing, but for carrying *umeke* or bowls, and as a foundation for the feather work already described.[1] All this is essentially the work of a primitive people. Hand-made mats, baskets, nets are found everywhere among savage races in one form or another, and however perfect the handicraft, however beautiful the form or decoration, we recognize the process as of a lower order of civilization. And yet there is a flavor of humanity in this simple work of untutored man that the mere mechanical products of the loom or knitting machine can never show. In the whirl and rush of the twentieth century there is little time for the natural work of human hands fashioning a basket, plaiting a mat or knotting a net; the people who can only make these things as their ancestors did long generations ago are passing off the stage, and the inanimate machine, the modern slave of civilized man, is doing this work,—but in how different a way!

Will the baskets of the Amerind, which now sometimes bear a valuation of several hundred dollars, be fairly replaced by any machine-made product? Will any loom put out such fabrics as the old Niihau mats, each one the work of years? It is the same with other hand-made fabrics. The Kashmir valley, where the songs of the weavers on the banks of the Jhelum are translated into harmonious design, may still smile at the fabrics of the steam-driven and ingenious looms of Jacquard in sunny France. The individuality is lost in the multitude. Can the most perfect productions of chromatic printing show to the critic the touch of the master whose work has been copied by many and intricate processes? When mats are produced by the yard, baskets by the thousands, and nets by the mile, artistic interest departs from them and we look only to their utility. Does not the father look with truer pleasure upon the first ungrammatical, misspelled composition of his child than upon the correct and finished writing of his maturer years?

Human nature also delights in rarities, and aboriginal mats and baskets are fast becoming few in number as their makers are "civilized" from off the earth. We have fragments of baskets and mats from the Egyptian tombs of early dynasties, and wonderfully woven cloths from the *huaca* of ancient Peru; but where, outside of a few museums, are the mats and baskets of a majority of the tribes of Amerinds? I do not know of a single specimen of old Hawaiian basket in any of the principal museums of the world,—the only complete specimen that survives is in the Bishop Museum.[2] The art is wholly lost to the Hawaiians and their choicest mats are now very rare. Basket making of the choice kind ceased on these islands many years ago, and another generation will have forgotten how to make *makaloa* mats. The subject then of aboriginal basket and mat making is growing in interest and importance, and even the islands of the great ocean can contribute to its history.

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[1] Memoirs B. P. Bishop Museum, Vol. I, No. 1.

In Polynesia there was no loom, for the pegs and bars used by the Maori of New Zealand to assist in weaving his mat of "flax" (*Phormium tenax*) do not deserve the name. Cloth was generally replaced by paper, commonly called tapa or bark cloth, from Rapanui to Kauai and across the ocean westward. All along the northern and western boundaries of Polynesia the islanders had looms, and, as we shall see later, those of the Caroline and Santa Cruz groups were sufficiently developed to turn out admirable products. If the proto-Polynesians came from Asia they saw a fence of looms across every possible path from thence to the Pacific. On all the islands where they settled there are and have been cultivated the paper mulberry (*Broussonetia papyrifera*), hibiscus, banana and other fibre-plants used more or less in the textile processes. The material was at hand, but with the exception of the Maori, whose climate forbade, Polynesians preferred to felt their fibres rather than weave them, although they all understood the process of extracting these fibres as in the hibiscus mats of the Samoans, the oloná cord of the Hawaiians, and the sennit of coconut husk fibre of Polynesians generally. That they made fairly good use of their knowledge, apart from the loom, I shall endeavor to show by the work of the Hawaiians and, so far as material is at my disposal, of other Polynesians and their neighbors with whom they had in ancient times more or less communication.

All through Polynesia the immigrants found vegetable products very fit for basket or mat making. Whether on some of the groups certain plants were brought with the immigrants or preceded them in colonization need not be discussed here. Everywhere they had, even during the period of their legendary history, the hala (*Pandanus odoratissimus*, *et al. sp.*) of which the leaves were used for both mats and baskets, and the fibres of the aerial roots for sandals and baskets; coconut (*Cocos nucifera*) whose fibres they twisted or braided, whose leaves they made into baskets, mats and fans, and whose rootlets they used to plait into fish baskets and traps; waoke

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[2] Several of these baskets have long been in use in Honolulu families, but almost invariably without the cover that properly belongs to them, as we shall see below. One, added to the Museum collection since the above was written, was in use for fifty-five years by the giver.

(*Broussonetia papyrifera*) whose fibres were beaten into kapa or twisted into strong cord; hau, fau, hibiscus (*Paritium tiliaceum*), whose bast yields a strong fibre used for mats and cords; and banana (*Musa var. sp.*), of which the fibres are of many grades, used chiefly for fine mats and belts.

The Hawaiians had in addition ukiuki, a thick-bladed grass whose leaves were braided into sennit to tie together the beams and rafters of the native house, *hale pili*; makaloa (*Cyperus lævigatus*), a sedge from whose tender stems the fine Niihau mats were woven; oloná (*Touchardia latifolia*), invaluable for its tough and durable fibre, from which were twisted cords for fish lines, nets, etc.; mamaki (*Pipturus albidus*), used mostly for felting into coarse, tough kapa, but also for cords and ropes; ieie (*Freycinetia arnotti*, and in Tahiti *F. demissa*), from whose aerial rootlets the choicest and most durable of the Hawaiian baskets were made; iwaiwa, several ferns from whose stems were plaited fish traps and baskets. Other fibrous plants of less extensive use will be noticed as they occur.

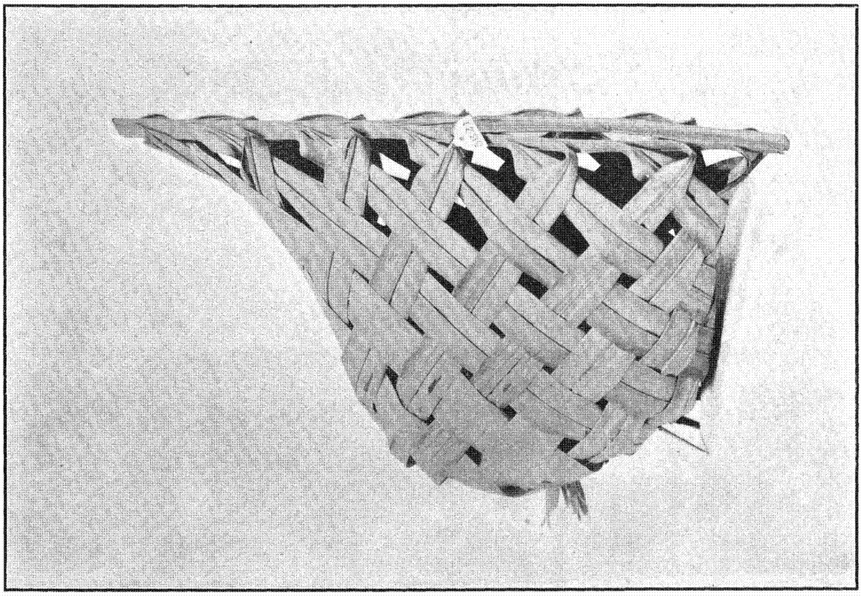

FIG. 1. COCONUT LEAF BASKET.

With this wealth of material, mostly growing wild, but in some cases, as waoke and oloná, cultivated for convenience or to improve the quality, it is not strange that the islanders made their clothes (scanty indeed, but sufficient), their beds and pillows, carpets and house linings, baskets, shoes and hats, fish lines and nets, sennit, cords and ropes of the varied form and quality we are to consider in this chapter. While the use of some of these fibres for felting in the interesting manufacture of paper (kapa), for which Polynesians are celebrated, must, from its importance, be treated in a separate chapter, the other uses of a textile nature will be treated here, arranged for convenience under the following heads:—

PALM LEAVES AND FIBRES.—Baskets, Fans, Sennit, Hats.
PALM STEMS.—Shields.
PANDANUS.—Hats, Mats, Pillows, Baskets, Sails, Mat Garments, Cord (covered), Fijian Basket.
FREYCINETIA ROOTS.—Baskets.
FERN STEMS.—Baskets, Fish Traps.
GRASS.—Makaloa Mats, Rush Mats, Cord, Bambu Fans, Combs, Spears and Clubs.
SANDALS.
AUSTRALIAN BASKETS.
HIBISCUS FIBRE.—Mats of the Samoans.
BASKETS OF MAORI.
BANANA FIBRE.—Looms of the Caroline Islands, Caroline Dress Mats.
OLONA FIBRE.—Nets, Koko puupuu.

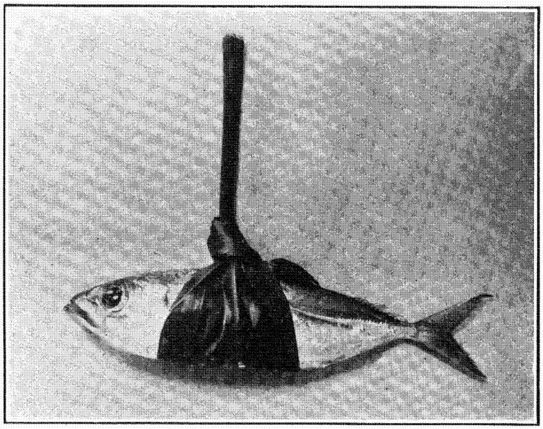

FIG. 2. HAWAIIAN KI LEAF BASKET.

While the order here indicated may in cases be departed from, the subjects will all receive attention and the general order will be preserved. It is an arrangement by material rather than by product.

Whether mats or baskets were first invented may not be definitely settled; nor is it of importance here where we are not treating of general manufactures, but only of special products in a region where man did not begin at the bottom, but came into the land armed with certain implements and a partial civilization. If it be necessary to explain why I begin with the latter, rather than the simpler mat, I would ask my reader to try to divest himself of all misleading facts of civilization as we know it, much as one does partially when camping in wild countries, or in living in this very Pacific region. He makes a hut of branches, he spreads a bed of leaves, but to gather the leaves as the birds do would be tedious and the night far gone before the couch would be comfortable; and he needs something which would answer to a basket although he can do without a mat. We are supposing him without clothing (in the fashion of the region), so he can neither use his hat nor his handkerchief. He might have been wrecked on a desert island without the very convenient concomitants of the Swiss Family Robinson, and to gather his simple food, whether roots from the ground, nuts from the trees, or fish from the sea, would a mat or a basket come best to hand? To preserve his little hoard would he prefer a basket or a mat? But a basket is a more complicated bit of work than a mere flat mat. Perhaps some baskets are truly more difficult to make than are some mats; but here is one (Fig. 1), common enough throughout the tropical world, which is as simple as can well be imagined, and, while an efficient basket, also suggests how to make a mat. The fresh leaf of the coco pâlm is always at hand and the suitable section of midrib is cut off from the long (10–12 feet) leaf and the leaflets braided together around whatever the basket is to hold. The strong midrib is the handle, and to open the basket it is only necessary to split this, an easy operation. The particular basket here figured came to me from Manila filled with delicious Manila mangoes—thanks to Lieutenant-Commander George M. Stoney of the U. S. Transport Solace—but similar rude baskets are made everywhere, and the traveler buys them at Suva or Apia filled with coral, and in some islands the carpenter or mason brings his few tools in a similar kit. Another that came to this Museum filled with madrepores is shown in Plate IV, the upper left-hand figure. The only simpler carrying machine of the nature of a basket known to me is the Hawaiian ki leaf (*Cordyline terminalis*), which is simply wrapped around a single fish (Fig. 2); or, if a number of articles are to be carried, as oranges or limes, a stem of leaves, each leaf

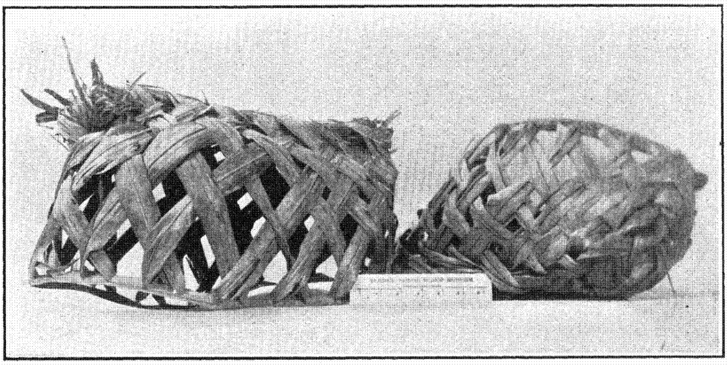

FIG. 3. COCONUT LEAF BASKETS FROM TUTUILA.

enwrapping a single fruit, makes a substitute for basket.[3] There are some satchel-like baskets (see Pl. II, Gilbert Island Basketry) that seem to be a folded mat, but on the other hand the basket may suggest a mat when it becomes ragged and broken open.

To study the evolution of a coco palm leaf basket we draw the material naturally from the central Pacific where the *Cocos nucifera* flourishes, and is indeed the principal tree of the low coral islands. Figure 1 shows a neat primitive form, but the more common of these simple baskets is much ruder and is used universally in bringing *copra* (the extracted meat of the ripe coconut) to the storehouses, for collecting fish and coral, and for many other purposes. In this Museum are Nos. 6592-93, which were brought full of coral from Pagopago, Tutuila, of the Samoan group (Fig. 3); and No. 5631, from Ponape of the Caroline Ids. (Plate I, left-hand upper.) Photographs in the Museum show precisely similar forms from Tonga and elsewhere in the coconut region. Baskets of this class are limited in size by the leaf of which they are made. In Fig. 1, No. 5621, the length of the top strip is 17 in., and from this the depth of the basket is 11 in. No. 6592 is formed of a split strip 35 in. long, bent end to end; No. 6593 has a similar strip 47 in. long: while No. 5631 is composed of four split strips, each about 10 in. long and with six leaflets, woven simply together, the ends of the leaflets being brought up the sides and tied together to form a handle (not shown in the figure). The last basket measures 16×13 in., with a depth of about 8 in.

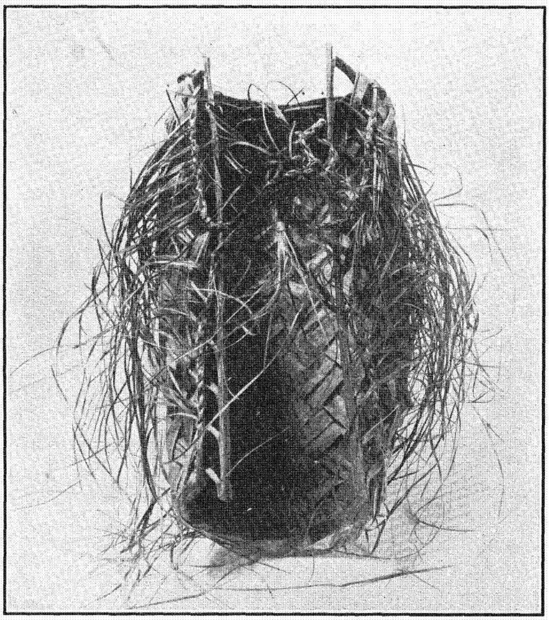
FIG. 4. COCONUT BASKET FROM SHORTLAND ISLAND.

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[3] Hon. S. B. Dole, in reading proof, reminds me that Hawaiians also tied the ends of the leaves together to make a sack for carrying ohia ai (*Eugenia malaccensis*).

It seems perfectly just to point to this type as the earliest form of basket, although made at the present day, no ancient specimen existing, at least from the region we are considering. The perishable nature of the material; the roughness of the workmanship; nay, the very abundance of specimens would account for their rarity or absence from early collections, for these were mostly made not for scientific purposes, nor to illustrate the life history of the natives, but simply as "curios", matters of oddity or rare workmanship. The series cannot be worked out from exclusively Hawaiian material because the coco palm, here near its tropical limit, does not grow freely nor develop luxuriant leaves: the pandanus was here the more important tree for the purposes of basketry as well as for mats, and the fashion of the basket and mat both partook of the peculiarities of material. We must turn then to the central Pacific for our illustrations.

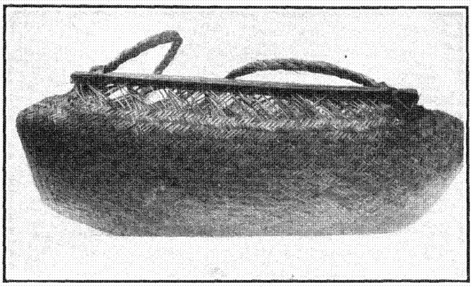

FIG. 5. PALM BASKET FROM PONAPE.

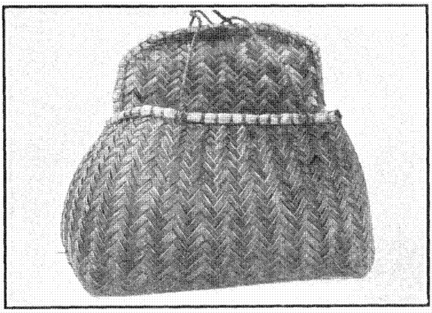

FIG. 6. COCO LEAF BASKET FROM THE CAROLINES.

Looking again at Plate I, next to the rude coconut frail, No. 5631, is a far finer basket, which at first glance seems to have little connection with its humble neighbor, but the curious form No. 8302, from Shortland Id., of the Solomon group, may prove a connecting link. Here we have the split midrib 15 in. long, with eleven leaflets on each half, and these are neatly and closely plaited, the leaves overrunning at the edges and brought back to the midribs where they are split and a portion braided into short loops for handles, the rest finely shredded for an ornamental fringe. Does

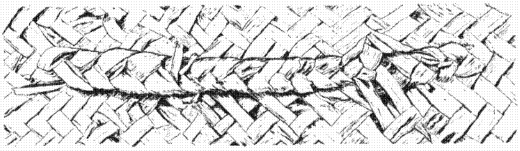

FIG. 7. CLOSURE OF BASKET BOTTOM.

not this chalk out in rough outline the far better finished basket of Ponape? (Fig. 5.) Here are the midribs 12.5 in. long, but instead of one there are eight on each side; that is, one is split into eight distinct pieces, and the portion of leaflet adhering to each is halved, each half passing in opposite direction in the weave, which is finer and twilled (three-leaf twill). The palm seems also to be of finer texture than the cocos, but is probably a young leaf. The edges or ends are continued in the weave so that they form a continuous side, meeting at the level of the midribs, as shown in the plate.

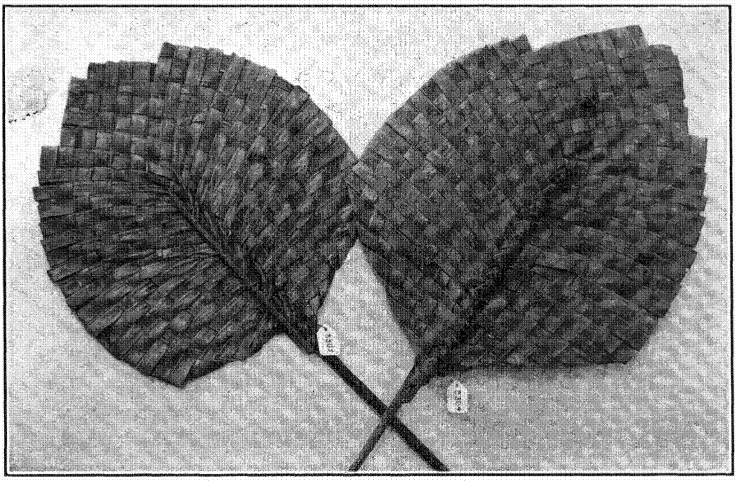

FIG. 8. FANS FROM THE SOLOMON ISLANDS.

The small rectangular basket, No. 7800, also from Ponape, shown in the corner of the same plate (II), measures only 5×3.7 in. at the mouth and is about 2.2 in. deep. While the material, coco leaf, is the same as used in the last example the structure is different. The twill is three-leaf and arranged so that a triple band passes like a keel through the length of the basket; similar bands pass from each corner of the rim and turn horizontally at the bottom, while the rest of the weave is at right angles to these bands. At the top the ends of the strips are turned alternately in and out over a rim of sticks which is beautifully and with great regularity sewn over and over with a two-ply thread apparently of some fine grass. Handles of similar cord but three-ply are attached to the corners.

We may return to the coco leaf midribs to see how they are used in fashioning a complete basket, not only in the Carolines, but in very closely allied form as far east as the Gilbert group (No. 7518, not figured). In the Caroline basket, shown in Pl. II, and also more distinctly in Fig. 6, the same bits of midrib that we have seen in the simplest form of basket appear here again, in a somewhat degraded form it is true, but when the covered rim is stripped of its covering of leaf sewed over with coco cord there are the sections of midrib, four in number, as the woody tissue does not stand a sharp bend without breaking, and only enough wood has been left to hold the attached leaflets together and at the same time take the place of the sticks often used in such a place. The leaf strips are twilled into each other (two-leaf twill), forming a continuous surface not absolutely symmetrical, and the ends are braided into a ridge extending over more than half the length of the bottom, as shown in Fig. 7. This ridge serves to strengthen the basket and protect the bottom from undue wear. The cover is formed in similar way but with only one strip of midrib, and is attached to the basket

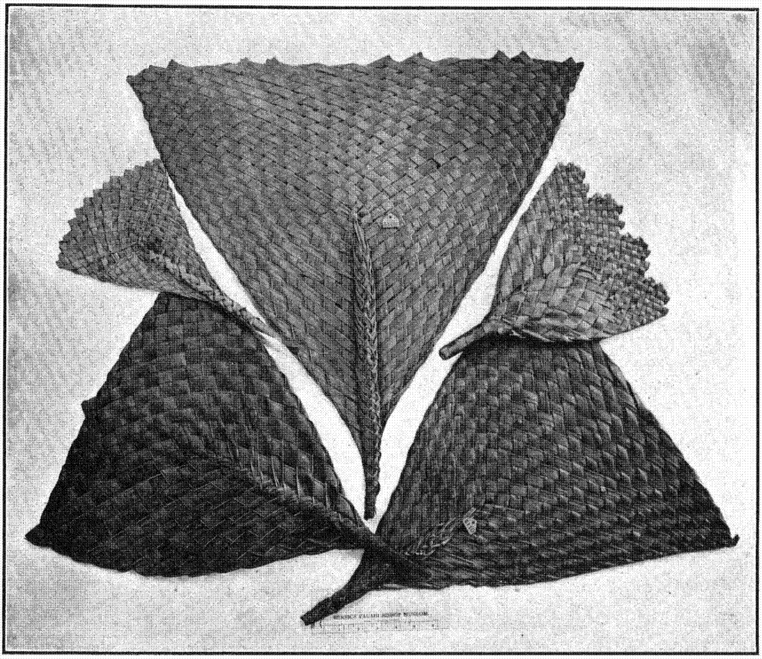

FIG. 9. HAWAIIAN COCO LEAF FANS.

not only on one of the long sides but for a short distance on both ends, apparently to keep the cover closed when not forcibly held open. The handles are of stout coco cord. In the Gilbert Ids. specimen, No. 7518, the form is more symmetrical, and the leaf used is lighter in color; otherwise the construction is identical.

The midrib structure appears again in the fans from Shortland Id., shown in Fig. 8. Two strips of a split midrib, each with six leaflets attached, are used in the weave; an additional portion of midrib stripped of leaflets serves as handle, the other midrib being cut off at the base of the blade. The workmanship is rude, by no means so neat as the Hawaiian leaf fans, but is effective. The blades are about 12 in. wide.

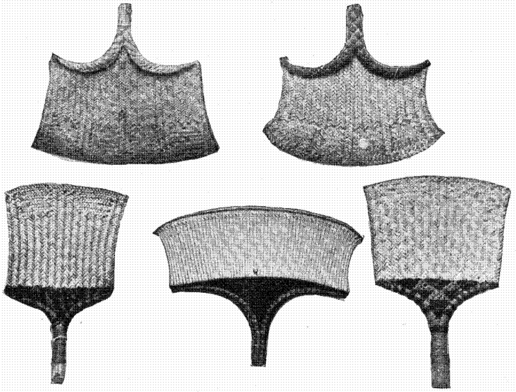
FIG. 10. HAWAIIAN FANS IN THE BRITISH MUSEUM.

Turning to the Hawaiian form of coco leaf fans (*Peahi niu*) we find a much finer elaboration of the same device. In Fig. 9 the fans, with the exception of the small one on the right, which is of pandanus leaf, are formed from a section of midrib not split, and the leaflets are deftly twisted over the midrib in a firm braid, the lower ones forming the handle without additional preparation, and the others with these gradually opening in the weave until the extent of the leaflets is nearly reached, when the ends are turned in, forming either a straight edge, or curved, smooth, or with serrations. Sometimes only one tooth appears in the middle. This form of fan is very practical and durable, and is much to be preferred to the more fanciful but modern designs shown in Plate XV. With the young leaves of the date palm the leaflets are often reflexed on one side instead of crossed (No. 5117). In modern times the leaves of some of the many introduced palms are used by the Hawaiians in the same way.

That fans were used by the old Hawaiians we learn from ancient *mele* or songs, and in the Song of Kawelo[4] occurs the following fragment:—

Papa o hee ia nei lae.
E u'alo, e ualo
Ua alo mai nei ia'u
Ka launiu e o peahi e;
E hoi au e, e hoi aku.

Go, daughter of Papa, away from
this headland;
Cease thy lamentations;
Cease to beckon to me with thy
fan of coconut leaves;
I will come again. Depart thou!

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[4] Contributions of a Venerable Savage to the Ancient History of the Hawaiian Islands. Translated from the French of Jules Remy by William T. Brigham. Boston, 1868. (p. 41.) Also reprinted by Nordhoff in his California, etc.

A form of fan used by the chiefs before the advent of foreigners is shown in Fig. 10, representing a collection of Hawaiian fans in the British Museum. None of these are so useful as those shown in the preceding figure. I have not examined carefully these fans, which have, I understand, been in the British Museum for many years; but, from the specimen in the Bishop Museum, shown in Fig. 11, it is probable that some of them are of pandanus. In this last fan, which is very old and brittle, the form is not so useful as ornamental; the blade is closely and neatly woven; the spreading handle, which is the remarkable part of the fan, is carefully embroidered with human hair and some brown fibre. In many respects this work surpasses in design anything Hawaiian in the department of basketry. Only the Solomon Islanders, as we shall see later on, have done finer work of the kind in their grass embroidery. The use of human hair, whether of friend or enemy, was common in Samoa and Fiji as well as on Hawaii, but on the last group the hair was almost always that of some friend. Several of these fans are in the Museum of the Peabody Academy of Science at Salem, Mass., most of them of good form. These were in the old Marine Museum early in the last century. I have never seen any of these old time fans in private collections on these Islands.

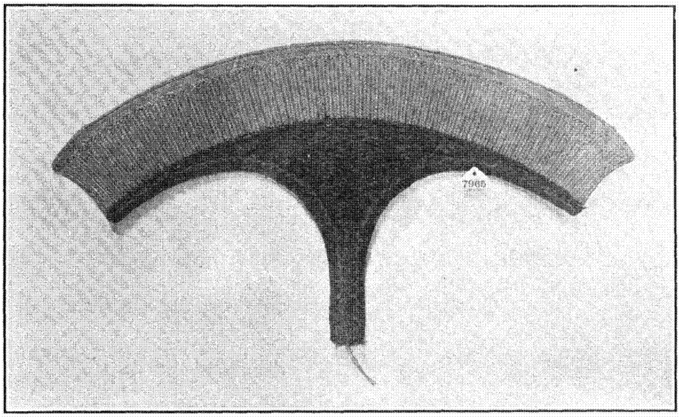

FIG. 11. ANCIENT HAWAIIAN FAN. BISHOP MUSEUM.

In all countries where the coco palm abounds considerable use is made of the leaves for walls, fences, fish weirs, screens, etc. Two leaves, or more commonly the halves of a leaf, are placed with the split midrib outward and the leaflets rudely interwoven. The sides of tropical houses are often made of this rustic paneling, and on the Hawaiian Ids. it is a favorite construction for sides and roof of temporary verandahs or lanai.

Before leaving the coconut fans a point in their construction may be noted. While the method described where the fan grows from the midrib is the common one, and perhaps the most natural one, there are often loose leaves that may be used for the purpose, and then the fan is started at the outer rim as a mat would be, and constantly narrowing the weave the ends are at last braided together to stiffen the blade and gathered to form a handle. This strucure is shown in Fig. 12, and may be termed the centripetal, while the former is the centrifugal system. In the illustration the first fan is Hawaiian and made of pandanus leaves; the second is also Hawaiian but made of palm; the third is from the Marshall group and is of coconut leaf, the handle neatly plaited with coco cord and edged with pandanus and hibiscus; while the fourth is from the Carolines and well woven from palm, but was covered on the edge coarsely with foreign cloth.

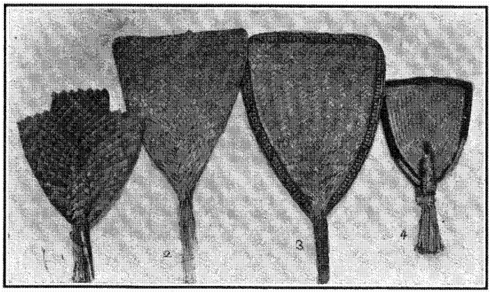

FIG. 12. VARIOUS FANS.

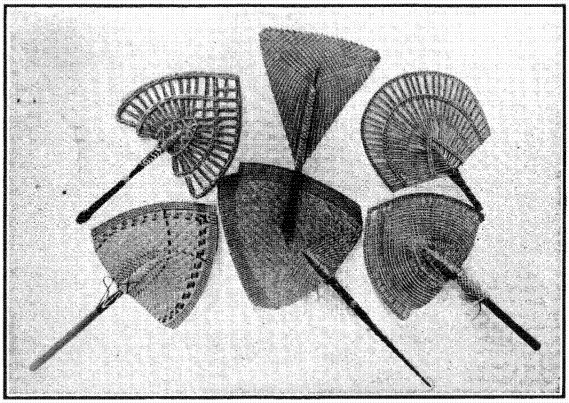

FIG. 13. SAMOAN FANS.

Samoan Fans.—To those who have only seen the skeleton form of fans usually purchased by travelers, or sold in the curiosity shops, the variety of form and construction of Samoan fans (*ili*) is surprising. Take, in the illustration (Fig. 13), the central triangular fan which recalls the common Hawaiian form, but is of entirely different construction. In the Hawaiian fan, it will be remembered, the weaving is uniform and the leaves themselves serve for handle; in the Samoan the weave is on a trellis, as it were, and the strands are very narrow, the handle is of wood braided in afterwards; it is a good substantial form. The curious way in which the edge strands are bent to cover the ends of other strands is shown in Fig. 14. Directly under this fan in the previous figure is one of considerble surface ending in a square trellis border, also shown in the figure of enlargements on the left. The handle is carved, as was generally the case in the better class of fans in the Society and Hervey Ids., and rather clumsily inserted, the ends of the central strands being bound to the shaft by a fine cord of human hair, that popular ornament in the Pacific.

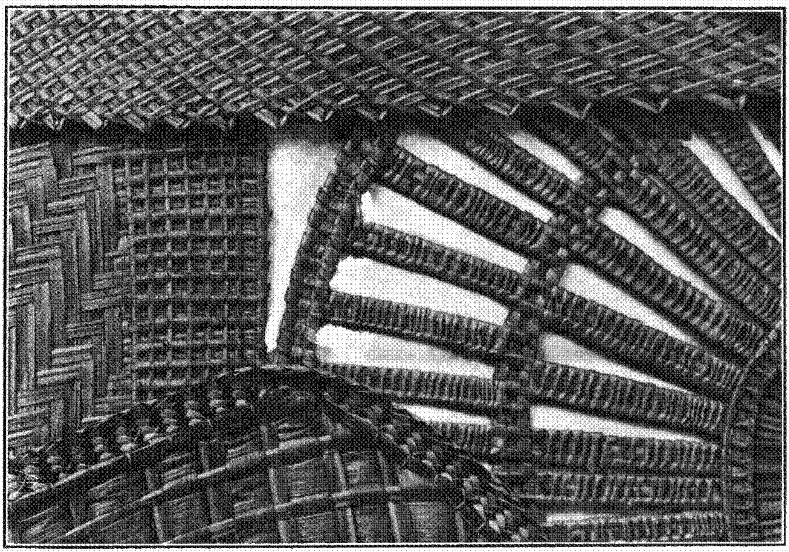

FIG. 14. ENLARGED FANS TO SHOW STRUCTURE.

In No. 2139, on the right of the triangular fan (Fig. 13), is a horseshoe-shaped skeleton fan which raises more wind than its open construction would promise. For handle the strands are bound together with sennit, and the general construction is shown on the right side of Fig. 14. On the other side of Fig. 13 is a pointed form, perhaps more common than the round. The other forms in the illustration need no especial description. As in almost all Pacific groups the modern manufacture shows a marked deterioration from the ancient standard, and in Samoa the use of other material than palm leaves, and the employment of tawdry dyes together with much less care in weaving mark the modern product.

Fijian Fans.—Rather coarse, clumsy, but at the same time durable and effective are the fans shown in Fig. 15. I do not claim that this is the only form in use in the Vitian group, where the work in carving and sennit is particularly good, but it is the only form of basket work fan that happens to be in this Museum,[5] and it is noteworthy for a peculiarity of structure. Several strips of the coco leaf are laid together on the upper edges to form a rim, and from these the two-leaf twill weave passes to the base where the ends of the strands are collected for a handle which is braced by braids on both sides of the fan and is wound with sennit. In both fans four strands of dyed leaf are introduced for ornament.

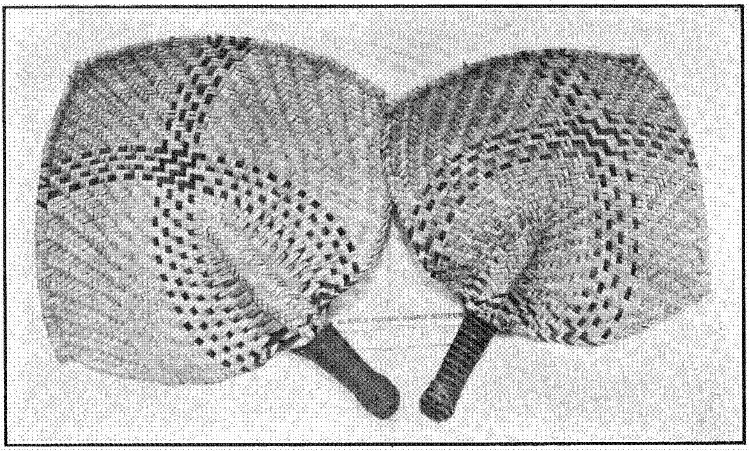

FIG. 15. FIJIAN PALM LEAF FANS.

Marshall Islands Fans.—In Fig. 16 are shown but three fans from a group where basketry flourishes and mats are made of remarkably good design and workmanship, as will be seen later on when fabrics of pandanus have their turn. To this later page must be referred the central specimen of the group which is of thin pandanus mat embroidered with red and black fibre. The mat is double and a stick is inserted for handle and covered with brown and black mat work of the same material as the body of the fan.

[5] There are kapa and tortoise shell fans in the Vitian collection.

While all the Marshall Islands fans do not have a border, this is certainly a very common appendage and is shown on all three fans in the illustration. The two specimens on the sides are woven in the trellis method as may be distinctly seen in the lower specimen of Fig. 14. The trellis is of the midrib of the coco palm leaf and leaf strips are woven into this framework, making a strong, stiff fan. The border is sewn on over a fibrous strip with fine coco cord, and the bundle of midribs, continuous with the blade of the fan, is covered with mat work as in the first specimen, the black here being some kind of bast, probably hibiscus dyed black with mangrove fruit.

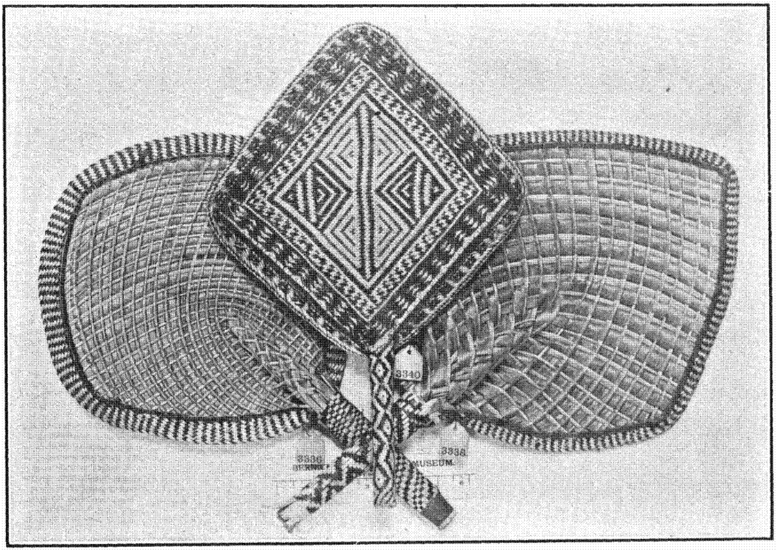

FIG. 16. MARSHALL ISLANDS FANS.

Not only the warm temperature but also the flies, which are a great pest on some islands of the Pacific, make fans a necessary implement for comfort, although the Samoans and other islanders used a fly-flap made of coco fibre mounted on a handle, and the Hawaiians used the feather kahili of small size for that purpose; and certainly the development of the fan industry merits a more generous treatment than can be given where only the basket work class can be used for comparison with similar work of the old Hawaiians, but a large collection of the fans of the Pacific has yet to be made, and even the old museums which have the most of the relics of old Polynesian handicraft have few fans. The use of fans as insignia of rank, so common in southeastern Asia, and seen also in the flabelli of papal display at Rome, does not seem to have had much vogue among the scattered islands of the great ocean.

The attraction of evolution has led us from baskets to fans, but we must now return to another form of basket made from palm leaf and wholly unconnected with the "midrib structure". No. 3346, in Plate I, is a coiled basket of palm from the Caroline Ids., looking at first glance like a rattan basket; but it is from the leaf and not the stem that it is constructed. To show the coils and the methods of binding these together Mr. L. G. Blackman has drawn for me two figures (19-20) and from these the entire structure of the basket may be seen;—the neatly sewed rim, the knots between each coil, the many sticks that compose this coil, and in the second diagram the curious displacement of what seem to be direct vertical lines of strip binding the coils. With these the curious reader can follow the construction, which certainly differs greatly from that of any basket belonging to the Hawaiian group, and it seems to show traces of a Malay origin, as do so many things and people of the Caroline archipelago.

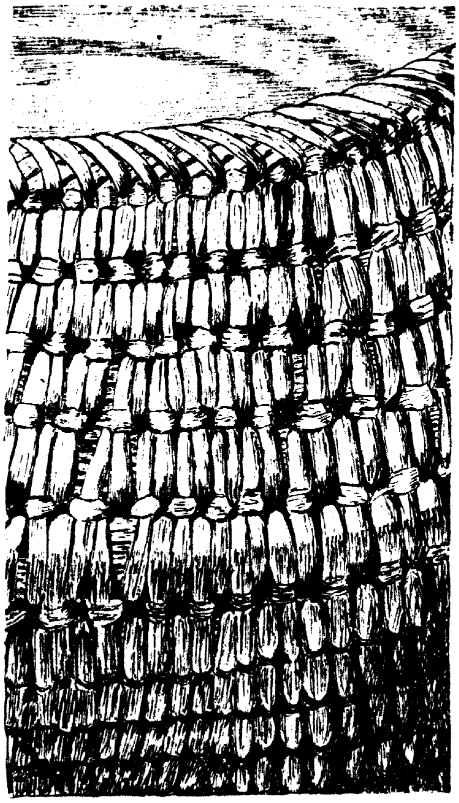
FIG. 19. CAROLINE IDS. BASKET.

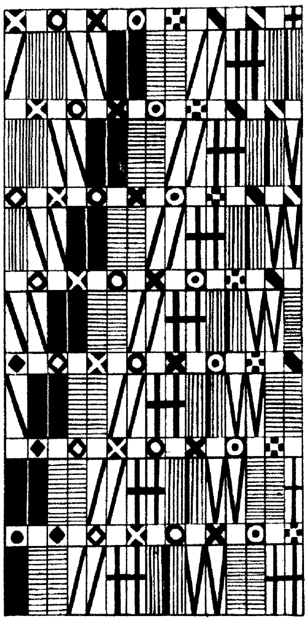
FIG. 20. COURSE OF STRIPS.

Solomon Islands Shields.—There are several plaited shields in the Bishop Museum, but one, No. 1859 (Fig. 21) is of very remarkable construction. A framework, 33×10.5 in., of rattan, light colored and rather soft but heavy, pared down flat, is covered with a fine weaving of rattan strips, the edges being bound by a braid of the same. Around the curved portions, top and bottom, is a border of pandanus strips about 0.25 in. wide, dyed red, folded over on the inner edge of the front of the shield, and the corners of the fold trimmed off so as to leave enough of the leaf to hold the two parts of the strip together. As shown in the illustration (Fig. 21), there is a decorative figure woven in black strips of the same material at top and bottom of the shield. Both sides are woven alike, including the black figures, but the inside has a covering of broad (5.5 in.) leaves of the pandanus. The decorations are very remarkable, consisting of twenty-three shell rings ⅞ in. in diameter in two transverse bands, and 3677 smaller shell rings or beads disposed in bands and pendants. The main bands are wholly of white shell, while the pendants are white, red (*Spondylus sp. ?*) and black, the latter of some vegetable matter at first thought to be coconut shell, but later, some marine growth. The bands are sewed with, and the tassels of the pendants strung on fine cord or coarse thread made of two-ply hibiscus fibre. The tassels of the pendants are tipped with perforated, elongated, pointed, black seeds with a hilum extending almost the entire length. Most conspicuous over all extends a cruciform figure composed of fifteen rosettes of red, black and yellow feathers. This cross seems purely geometrical and not an introduction of some missionary, for at the time this was obtained no missionary had landed on these shores since Mendaña raised the cross and took possession for Spain, and we read that the crosses he erected were at once destroyed by the natives.

When it is considered that the several thousand shell rings had to be bored with a rude pump drill, then strung in numbers on a tough midrib and rolled between stones until round, it will readily be admitted that the great value the islanders attach to such a shield is justified. Two other rattan

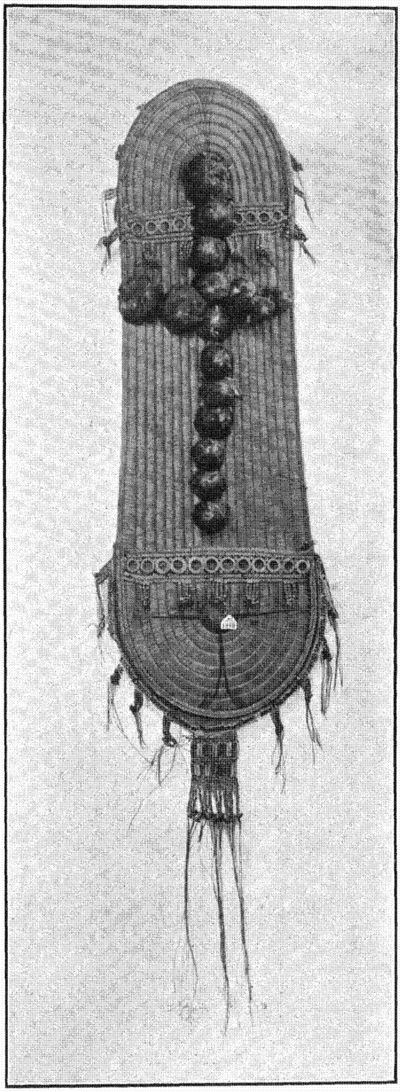

FIG. 21. SOLOMON ISLANDS SHIELD.

shields of a more common sort serve well to explain the material and structure of the shield just described. The shape of the shield No. 1860 differs considerably from that of the one first described, and the weaving becomes a very secondary part of its composition. The shield consists, as may be seen in Fig. 22, of seventeen strips of rattan graduated in diameter from the central one, which is the largest. Besides these rattan strips, which gave the clue to the material of the first shield, where the skeleton is completely concealed by the weaving, are rounded strips of dark colored palm wood which bind the whole together with the help of thirty-two transverse braids. The length is 33 in., and the greatest width is 9.2 in. This specimen is from Ysabel.

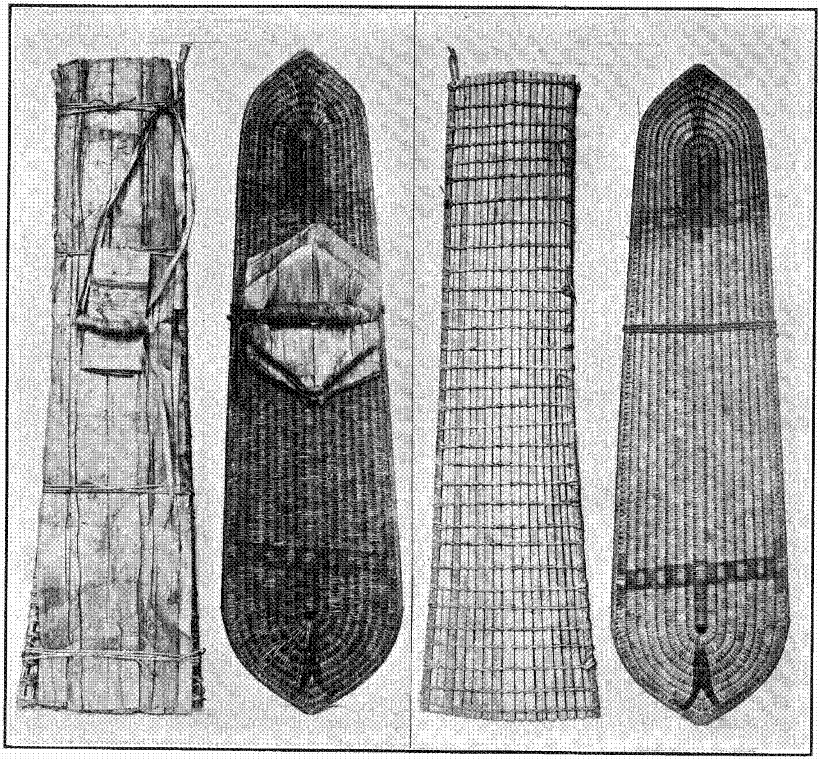

FIG. 22. RATTAN SHIELDS FROM THE SOLOMON ISLANDS.

No. 8315 has more the general shape of the first shield and is made in the same way, but the weave is single and not very close, so that the rattan strips which compose the substance of the fabric are easily seen between the strips of rattan skin. The course of the rattan (for so far as it appears it is a single strip) is spiral beginning at the centre of the lower and larger semicircle and ending on the right-hand outer edge of the smaller end. The designs are woven in with darker strips and are the same on both sides, but the dark and weather-stained surface of the shield renders these indistinct in the illustration. The inside is much less carefully woven, and the pandanus leaf lining is reduced to several hexagonal pads about the handle. This shield came from Rubiana, where its native name is *bako*, according to our collector. No. 1861 is a plain wooden shield of the same shape, and with similar designs in black but without weaving. It is lighter than the rattan shields. In some collections are wooden shields from this group decorated with inlaid pearl shell.

Besides the leaf the coir or fibre of the external coat of the coconut is much used in basketry. This coir is a well known article of commerce and is common in door mats and carpets, so that no especial description is needed here. In Polynesia its use for sennit is universal. In the olden time the houses were tied together with it; outriggers made fast to the canoes; stone adzes bound to their handles; and in fact it was a most important factor in domestic economy and industrial art.

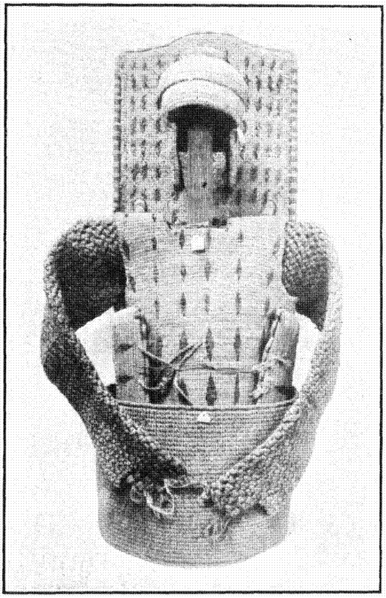

FIG. 23. COCO FIBRE ARMOR. GILBERT IDS.

On the Gilbert Ids. the natives made a most elaborate and effective armor from this fibre that afforded protection from the weapons of shark teeth used in their warfare. Specimens of this armor are in most large ethnological museums, and Fig. 23 will show the common form. There is a jacket and trousers of netted fibre close and tough enough to generally withstand the shark teeth, but certainly so harsh in texture that the hair shirts the penitents of medieval Europe are said to have worn next the skin would be a comfortable exchange. A white man's skin could hardly bear the rasp of the netted fibre. In many cases jacket and trousers are in one piece, like the combination suits of modern clothing, and over all this came the cuirass with its high back to protect the head. While there is no difficulty in tracing the weave, it is hard to see how the stiff and refractory cord was so closely bound together by fingers, however tough and strong. Over this cuirass was often worn a belt of even firmer texture, as shown in the illustration, and the helmet which capped the whole was ample protection from a shark tooth sword, or even from an ordinary club. None of this armor has been made for two generations, and the people of today cannot tell how their grandfathers wove the curious basketry that now is found only in museums. By experiment it is found that a man encased in this armor is unable to get out of it without the help of his esquire, another parallel with the antipodal armor of medieval Europe.

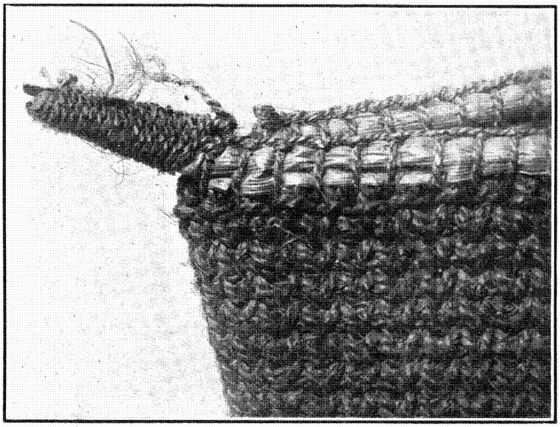

FIG. 24. END OF SENNIT BASKET FROM PONAPE.

Of the basketry proper a good example is shown in No. 7796 of Pl. II—a sennit basket from Ponape. The rectangular bottom is of cord twined over a foundation of sennit and is rather open; but the sides, as may be seen in the illustration (Fig. 24), are closely braided and the top is finished with pandanus leaf bound with sennit. The ends of this border are of split midrib and project 1.2 in., and those of both sides being bound firmly together serve as a spring to keep the mouth of the basket closed. The handles are small loops of sennit about large enough for a single finger. This is, or was, a common Ponapean form and seems very durable. Two specimens in the Bishop Museum are of the same size and pattern, 18 in. long at the top and 10 in. high.

Reference has been made in a previous publication (Director's Report, 1899, p. 25) to the curious way in which sennit is sometimes wound for use or preservation, and the illustration given there may be here repeated for the convenience of the reader (Fig. 25). This braided cord of various sizes was made generally by the old men, who took their "braiding" to the public palavers, much as the old ladies of the higher races take their knitting to an afternoon gathering for gossip or sociability. Before the advent of nails to the Pacific sennit was in universal use, and its wide usefulness can hardly be appreciated by people who have a whole arsenal of nails, screws, bolts, clamps, etc. But our interest here is in the use made of this braid in basketry. Besides the example from the Carolines we have the curious cylindrical covered basket from Tonga, of which I have seen one in the Berne Museum and two in the British Museum (Fig. 26), but I believe them to be very scarce in the Tongan group at present. They are plaited in brown and black triangles, and decorated with white, seldom black, shell disks. Mariner gives in his account of the Tongan Islanders (1817) the following description of Tongan mats and baskets:

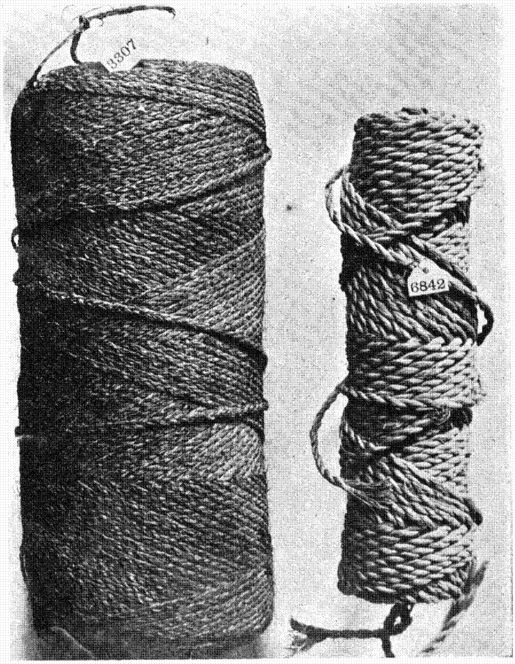

FIG. 25. ROLLS OF SENNIT.

> In respect to mat and basket making, they have mats of various kinds, made of strips of leaves or bark selected, dried, and otherwise prepared; all of which, except one or two of a coarser kind, are fabricated by women. The following are the names and quality of them:
>
> GNAFI GNAFI [GAFIGAFI].—Mats to wear, of a finer quality, made of the leaves of the *fa* or *paoongo* [pandanus], that have been transplanted, in order to give them a finer and softer texture.
>
> GIE.—Stronger mats made of the bark of the *fow* [fau=hibiscus], or *olonga* [olonà], worn chiefly by people in canoes to keep out the wet, as the water does not damage them: they appear as if they were made of horsehair........
>
> FALLA.—Mats to sleep on, made of the leaves of the *paoongo*. These are double, and are of various sizes, from six feet by three, to seventy or eighty feet by six; to lie along the whole length of the house.
>
> LA.—Mats for sails, made of the leaves of the *fa* [pandanus]; they are very strong and light.

TACAPOW [TAKAPAU].—Mats for flooring houses, made of the young leaves of the cocoa-nut tree.

TATTOW [TATAU].—A sort of matting, plaited in a very ornamental way, made of young cocoanut leaves: they are used to screen the sides of the houses from the weather.

CATO [KATO].—Baskets: these are of various constructions; sometimes of a sort of matting made with the leaves of the fa, paoongo, lo acow [akau=sugar cane], etc.; at other times of the fibrous root of the cocoanut tree interwoven with plait made of the husk of the nut, and have rather the appearance of wicker-work: the latter are sometimes variously stained and ornamented with beads or shells worked in. The larger and coarser baskets are generally made by men, to hold axes and other tools in; also the baskets to hold victuals, made of the leaves of the cocoanut tree are generally made by men.

BAWLA.—Mats for thatching houses, are either made by men or women, but more frequently by the former.—Vol. II, p. 293.

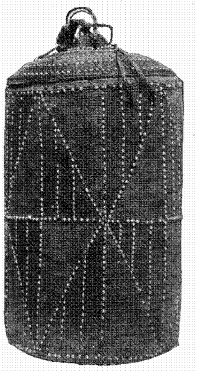

FIG. 26. TONGAN BASKET IN BRITISH MUSEUM.

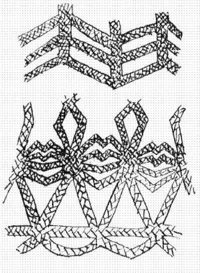

FIG. 27. OPEN WORK MATS FROM TONGA.

The Tongans also covered wooden boxes with basket work, as we shall see later that the Hawaiians did with great skill. The Tongans had oblong baskets in black plaiting with brown decorations; a square basket of unusual weaving, as shown in the Museum at Berne, where many of the specimens date from the time of Cook, whose artist, Wäber, was a native of that city and bequeathed all his collections to that municipality. With these were specimens of the curious open-work mats (of pandanus) shown in Fig. 27. In New Caledonia the gourd calabashes were artistically corded with sennit. The use of sennit on Fijian clubs, both for the grasp and for decoration, may also be noted. Even the Fijian spears were often ornamented with bands of fine black and white sennit. Not only the braided form was used, but also the plain twisted cord.

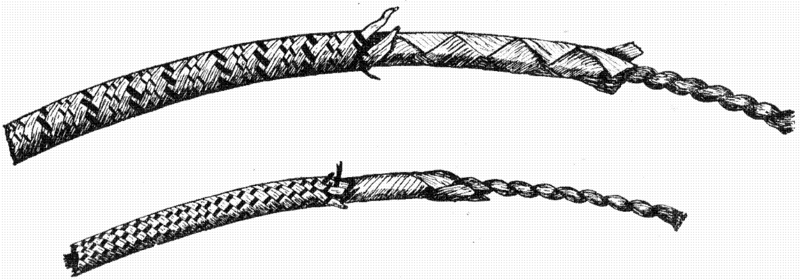

FIG. 28. COCO CORDS FROM MICRONESIA.

In the Carolines the braided slings of this fibre were sufficiently ornamental to serve as headbands when not in use for throwing stones. In the Marquesas a broad, flat braid was used for holding taut the heads on the large wooden drums. On Hawaii a smaller braid was used for the same purpose; and also, as will be seen later on, for securing the covers to the fine baskets of *ieie*.

The Fijian temple house was sometimes entirely covered with sennit, and small models of these are in many museums, constructed of the same durable material. The attachment of the stone axe or adze to its handle was by coconut cord neatly interwound. By the same means the parts of a canoe were united, and the cable for the stone anchor was generally of the same material, as it did not rot when wet.

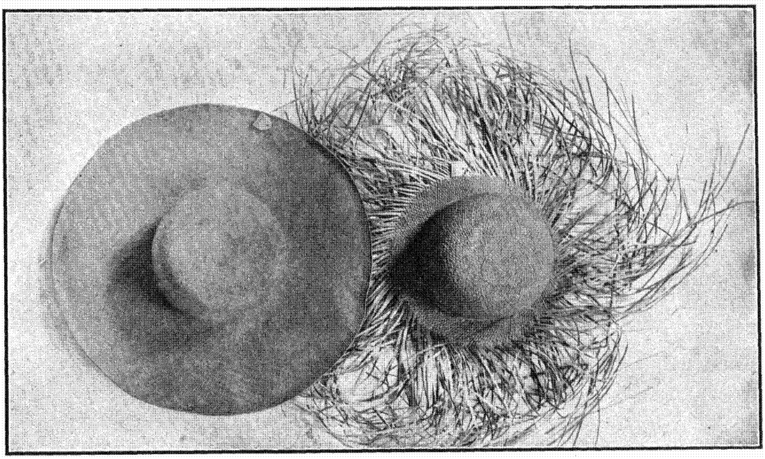

FIG. 29. PALM LEAF HATS FROM GUAM, MARIANAS.

Decorated Cord.—A coco fibre cord used in coils for belts, and for other purposes of ornamentation, is covered with a neat braid of pandanus leaf, and dyed hibiscus bast mingled in many tasty patterns. These cords were, in former years, brought to Honolulu from the Marshall and Gilbert Islands, and were much used for hanging pictures, as the strong fibre was not eaten by insects. This beautiful cord is formed in three concentric parts, as shown in Fig. 28. First a cord, usually of two-ply coco fibre; then comes a coat of plain pandanus; third, the woven coat of brown and black, which gives the cord its beauty and variety. The weavers must have very deft fingers, but I do not know whether the two pandanus coats are put on separately or simultaneously, that is, in close succession. There are many sizes and patterns of the cord in this Museum.

The rootlets of the coco palm are small and of nearly uniform size, well adapted for basket work. A fish trap that I once purchased at Pagopago was made of these white rootlets and measured 20 in. in diameter and 10 in. in depth. As I carried it from the canoe up the accommodation ladder of the steamer, the Samoans, assembled in their canoes about the ship, set up a shout, imagining the foreigner was going a fishing.

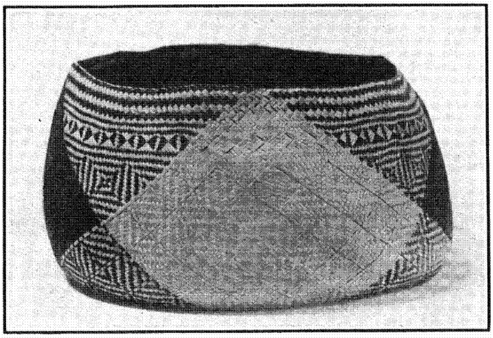

FIG. 30. BASKET OF PALM LEAF, SOLOMON IDS.

The native palm, of which there are two species on the Hawaiian group—*Pritchardia gaudichaudi* and *P. martii*—is much used for hats, baskets, mats and fans. The leaf is palmate and sometimes 4 ft. in diameter; the young leaves are used before they have become green, and usually are split into strips not exceeding ⅛ in. in width, and for hats these are much narrower. Young leaves of the date palm are used in the same way, but they have less flexibility than the loulu or native palm, and so are not as well adapted for hats. As in ancient times the Hawaiians wore no hats, this industry is modern, and so far as hats are concerned it extends without much variation through Micronesia. Fig. 29 shows two hats of palm leaf, one of fine texture finished, the other coarser, partly braided. Natives of Hawaii making similar, though not so fine, hats of loulu palm are shown in the figure on the title page, a view taken in 1888 at Napoopoo, Hawaii, by Mr. Acland Wansey, formerly of the Museum staff.

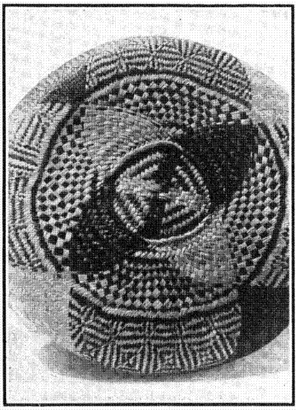

FIG. 31. BOTTOM OF NO. 8312.

For a very interesting basket of palm leaf we must turn to the western Pacific. On the Solomon Islands is made a basket of bowl shape, flexible, so that when empty it can be folded together like a good Panama hat. It is tastefully decorated with red and yellow strips, as can be seen in Fig. 30. The curious matter in its construction is that it has neither beginning nor end; it is a ring. Where the navel or point of beginning of an ordinary basket is found here is a hole 3.5 in. in diameter, the edge finished off as if the basket was complete at that place, as can be seen in Fig. 31, which represents the bottom of this basket, No. 8312. To complete the basket the maker sews in a square patch, which seems like putting a square peg in a round hole, but as the square patch is sufficiently large to cover the round hole the basket is complete. The patch is solidly interwoven, but as may be seen in Fig. 32, which presents the inside of the bottom, it is not a very trim contrivance. What the object of this feature is I do not know, but conjecture that the maker finds it more convenient to pass her hand through the hole while weaving. In two similar baskets in this Museum, although only half the size of the one illustrated, the bottom is pierced with a hole of the same size. The collector of these baskets did not notice the peculiarity, and so did not inquire the reason, and letters sent to the island Florida where they were made have not yet brought a reply. That the construction is not peculiar to this particular form of basket is seen in another made of coco leaves shown in Fig. 34. This bowl-like basket is 13 in. in diameter and 6 in. high. The mat plug is ornamentally woven to match with the basket, and the ends of the strips are knotted in the rim and left long, which would seem to be an objection to the pattern.

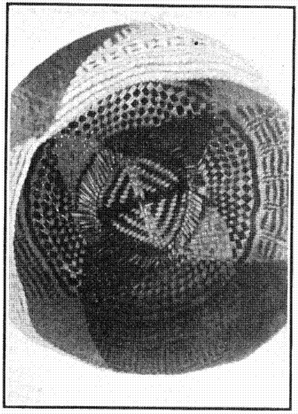
FIG. 32. INSIDE OF NO. 8312.

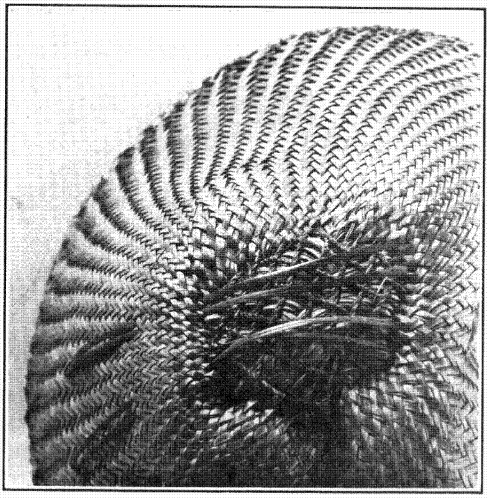
FIG. 33. BASKET FROM NEW HEBRIDES.

In the New Hebrides we find a similar structure, shown in Fig. 33, where the central portion of a coconut basket is filled with a rude "darn" of coco cord. The long strips crossing the bottom appear again on the sides and serve for handles to this very flexible basket. Returning to basket No. 1888 (see Fig. 34) we also come back to our primitive coco leaf structure. The midrib is split and cut into short sections with the leaflets attached, and these sections break joints all round the inside of the rim, as shown in the figure, where one is supposed to be looking into the basket. The weave is usually a three-leaf twill changing four times in the circumference from the vertical to horizontal with five-leaf twill; the upper rim is braided. To make the basket of good substance the leaflets are double, the midrib in centre of fold, so that it shows on the external edge of the strip. The basket is 14 in. in diameter and 9 in. high, and the bottom hole is 4.5 in. in diameter, and the plug, as may be seen in the figure, is rudely rounded, the ends of the doubled leaves being left very long. There are no handles. The basket in the upper part of the illustration is also from the Solomon Ids., but of a very different model and material. It is certainly a common form of food basket, as the Museum possesses three examples, two of them quite large. In these the bottom is made in the usual way without the mysterious hole. In our ignorance of the botany of the Solomons it is difficult to determine the material used, which much resembles rattan and was so labelled some years ago. If it be calamus it has been dyed a dark brown, almost black. Cane baskets of coiled work are common among the Australian natives; another in this collection is from Fiji; and still another from New Britain. A plain flat rattan basket from Santa Cruz is shown in Fig. 35. This is 20 in. in diameter, and the splints of rattan are taken in threes and simply interwoven; the ends are not turned but bound into a rim of sticks, an insecure method, as may be seen at the bottom of the figure. The absence of the genus *Calamus* in most of the Polynesian groups is sometimes made up by the use of bambu, but usually the flexibility of the former cannot be imitated by the stiffer grass. In the Pelew Ids., however, baskets of bambu have something of the

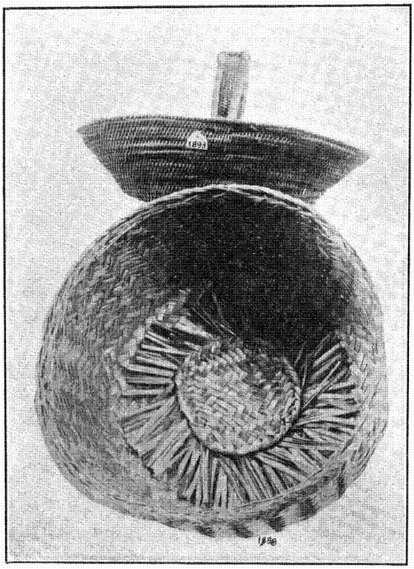

FIG. 34. BASKETS FROM FLORIDA, S. I.

rattan physiognomy (Fig. 36). In the specimens figured, Nos. 8073-4, three stout strips serve for frame; over these the body is uniformly woven and the ends turned on sticks wound over and over by thin strips of bambu to form a rim. The bilge of the basket is protected and kept in shape by a twining of two bambu ribbons. These baskets are 8 in. in diameter and 3 in. deep. They approach the Chinese work closely.

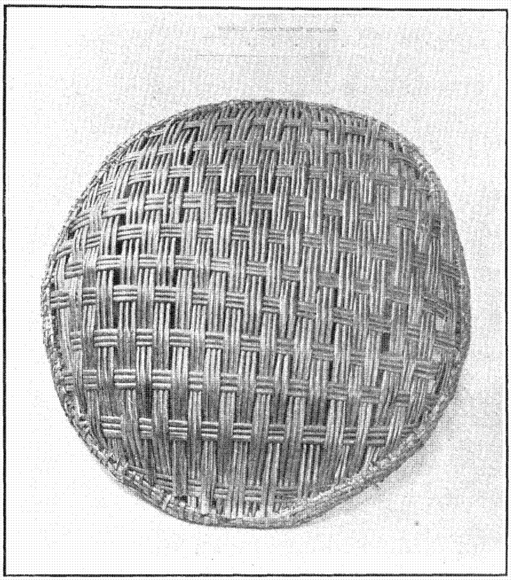

FIG. 35. BASKET FROM SANTA CRUZ.

Other satchel-shaped baskets of palm are in the Museum collections, but the localities are uncertain, and it seems better to pass them by, for the present at least. In the East Indies rattan is used to make excellent sleeping mats, and I have seen palm leaf used for the same purpose, and as carefully finished as the strips of palm used for books. I know of nothing of importance in the nature of mats made from palm in Hawaii or the rest of Polynesia, except those of the loulu palm of the Hawaiian group. These are smooth, rather stiff, and are used for beds or for tables. One in the author's possession measures 5×7 ft., and has thirteen strips to the inch. Another in the Museum, No. 2790, measures 6.5×5 ft., and has the same fineness. They are less durable than the pandanus mats.

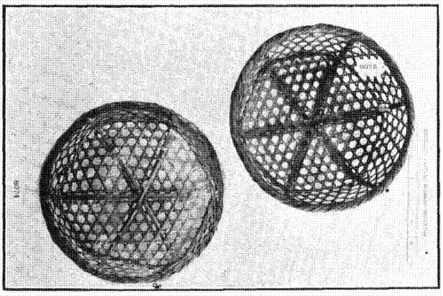

FIG. 36. BASKETS FROM THE PELEW IDS.

Pandanus Work.—Useful as the Cocos, King of Palms, undoubtedly is, the pandanus is more used in the Pacific region. For mats it ranks first; and for satchels, sacks, or any construction where flexibility must be conjoined to toughness and durability it generally displaces the stiff leaf of the coco or the harsh and less pliable coir.

Of the genus *Pandanus* there have been described half a hundred species, chiefly found in a region of the Tropics extending from the islands off the East coast of Africa to the eastern limits of Polynesia: a single species has been described from the West Indies. There is, however, great uncertainty in the differentiation of these species, owing partly to the difficulty of preserving for herbaria the male flowers and large female fruit resembling a large pine cone, from which the common name "screw pine", but unlike the pine the pandanus cone falls to pieces when ripe or dried, the keys clinging but loosely to the core. Although the trees of the Hawaiian Islands have all been referred to *P. odoratissimus*, there are marked varieties in the fruit (as the fine red *hua hala*, much prized for lei among the Hawaiians) and the texture and size of the leaves differ greatly, although this may be due to location and soil. In the Micronesian region the fruit is edible and forms an important article of food, while in the Hawaiian group it is not very palatable. Leaves in this Museum from the southern islands are finer and narrower than the Hawaiian, while rolls from Guam cannot be

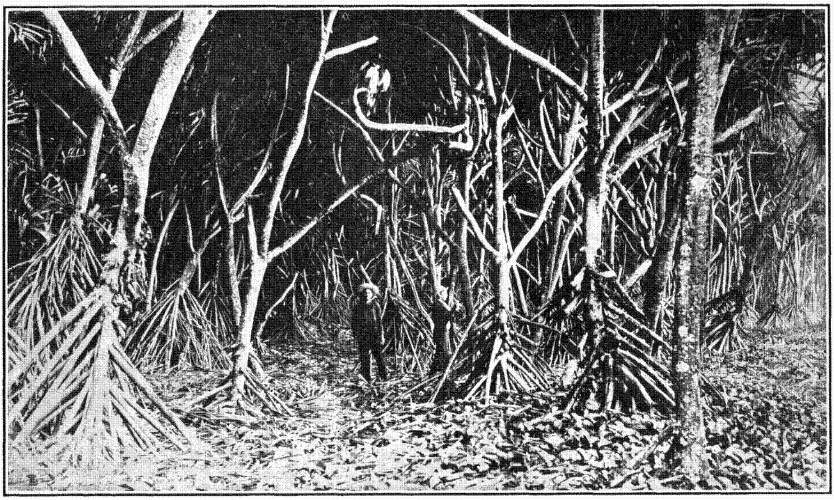

FIG. 37. PANDANUS GROVE IN PUNA, HAWAII (1888).

distinguished from the native product. Much of the uncertainty at present with the genus pandanus will soon be removed, by the labors of European botanists who are revising the species, but in the meantime fortunately our study of the use of the leaves in basketry does not depend in the least upon the name assigned to the particular trees that furnish us with the leaves used in these islands.

Forty years ago there were many groves of pandanus or *hala* as the native name goes, besides scattered specimens, so there was no need of cultivating the tree like the breadfruit and coconut about the houses, but the increased cultivation of sugarcane has caused the destruction of the native trees, and groves like the one shown in Fig. 37 are now uncommon. The scarcity of leaves and the disinclination of the natives to use those still attainable has made lauhala mats and baskets scarcer than the mats and baskets imported from China, and the native manufacture is journeying towards extinction like so many other industries of the olden time. Puna was a famous region for hala mats, and in 1864 the author, when journeying through the district with that noble missionary the Reverend Titus Coan, saw many a party in the curious open caves (caused by a breakdown of the lava crust in some of the many streams of lava, ancient and recent, that form much of the surface of Puna) busily engaged in weaving mats, a work for which the comparative coolness and dampness of the caves was most suited. A quarter of a century later in traveling the same road with a younger companion the scene was greatly changed: the caves were there, the hala trees were there, but the inhabitants had gone, and for sixty miles there was nothing but a few deserted churches and some aged breadfruit trees to tell that once people had lived there. Fifteen years later the scene had again changed owing to the opening of roads and the cultivation of sugarcane, but the present inhabitants were not the old natives, and the mat making is only here and there continued when there is a chance to sell to the foreigner.

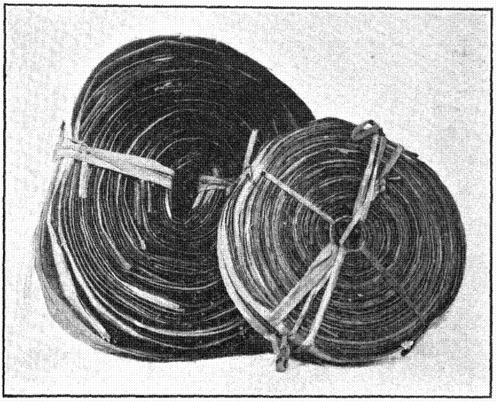

FIG. 38. ROLLS OF HALA LEAVES.

In size the hala leaves differ greatly and some exceed 6.5 ft. with a width of 7 in. In the groves like the one figured (Fig. 37) the ground is thickly covered with the deciduous leaves. The base of the leaf which broadly clasps the stem, is cut off and the very prickly margin also removed. This was especially the work of the old women, and as late as 1888 I saw an ancient dame near Kailua, on the western side of Hawaii, continuing the work of her ancestors. She was reputed to have outlived the century mark, cramped in every joint, unable to stand erect, kenneled in a grass hut not four feet high, she was still busily and cheerfully trimming hala leaves with a sharp shell. As I watched her slowly completing her task there came back to my memory most vividly the groups of old women I had seen in Puna doing the same thing while the children gathered up the refuse or laid aside the neat rolls (Fig. 38) into which the prepared leaves were rolled to keep them flat. Drying the leaves was done in the sun or in the shade to secure the differing tints of brown so ornamental in combination in the more elaborate mats. The leaves are readily split longitudinally, and in mat making strips from ⅛ in. to 1.5 in. are used. If the full width of the leaf is needed the midrib must be trimmed down, otherwise the blades on either side are alone used.

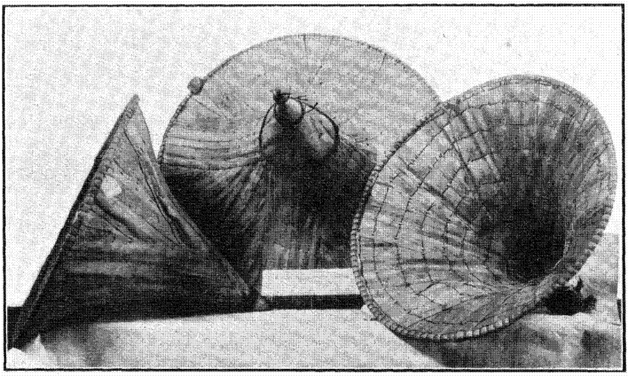

FIG. 39. PANDANUS HATS FROM THE CAROLINES.

Pandanus Hats.—While the natives of the Pacific were not a hat-wearing race, on certain occasions some shade or protection was required in spite of the usually thick crop of hair. Such are the long exposures to the tropical sun above and to the gleam from the water beneath in reef-fishing, and from Guam through Micronesia the pandanus leaf is made into a single pattern of conical hat for the fisher's use. Fig. 39 will show the simple structure. The leaves in several layers are stitched together with two-ply coco cord and are bound solidly and neatly at the apex and around the rim. The hats illustrated are from Ruk in the Carolines, but specimens in the Museum from

Guam are precisely alike. They are all nearly of one size (19–21 in. in diameter), and are tied under the chin. The simple vizors of the Fijian and the Solomon Islander answer the same purpose.

From Ebon, Marshall Ids., comes a pandanus mat of neat and curious construction. The leaves are selected of full width, excepting, of course, the prickly edges, and are strung double on strips of the same material, 3/8 in. wide. These strips show full length on the inside (see Fig. 40), but on the outside there are four stitches shown, and these come at the edges of the leaves in such a position as to bind them securely together. Between the rows of stitches, and of course between the double leaves, are inserted free single leaves to give body and elasticity to the mat, which in the specimen illustrated is 25×45 in. Two of these mats are sewn together by a stout seam of pandanus strip, shown on the bottom of the figure, while the other edge is neatly hemmed, as may be more clearly seen in Fig. 41. The long binding strips are simply

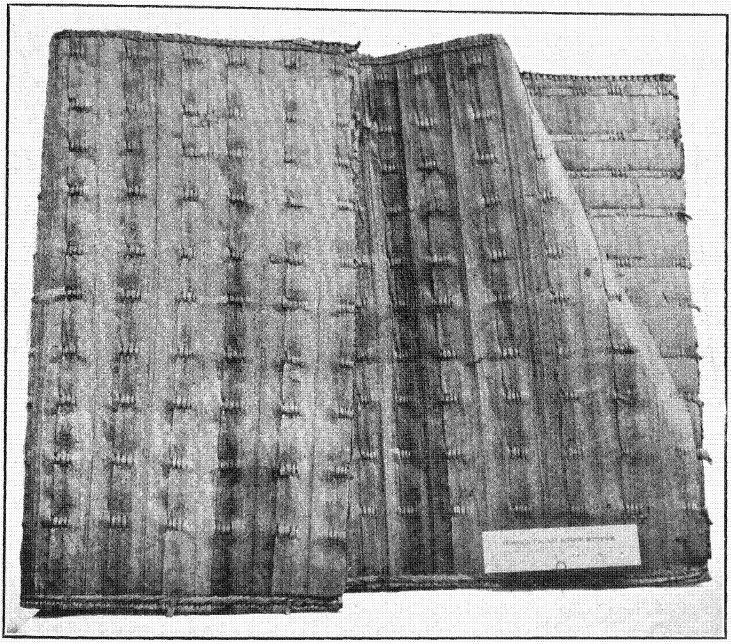

FIG. 40. PANDANUS MAT FROM EBON.

knotted at the end of the mat. This certainly makes a smooth, elastic and very comfortable mat. Those who live in cold climates can hardly appreciate the great comfort in sleeping on a hard surface covered only with a leaf mat. Feather beds, matresses, spring beds are quite superfluous to one accustomed to roll up his bed when he awakes in the morning.

Another sleeping mat or *sarung* from Shortland Id. of the Solomon group is 6 ft. 5 in. long, and 3 ft. 2 in. wide, made of the same wide pandanus leaves joined at the edges by almost invisible coco cord stitches, and like the preceding in double series so that the outer and inner leaves break joints. The ends of the leaves are not turned but sewed together by a running seam of coco cord, one cord extending along one side while another is put through the leaf from the other side and over the first cord. The leaves are of great width (6–8 in.) and are sewed together and then turned, a single thread extending the length of the leaf and then knotted and a few loose inches allowed to hang as a fringe. This forms a bed both smooth and waterproof.

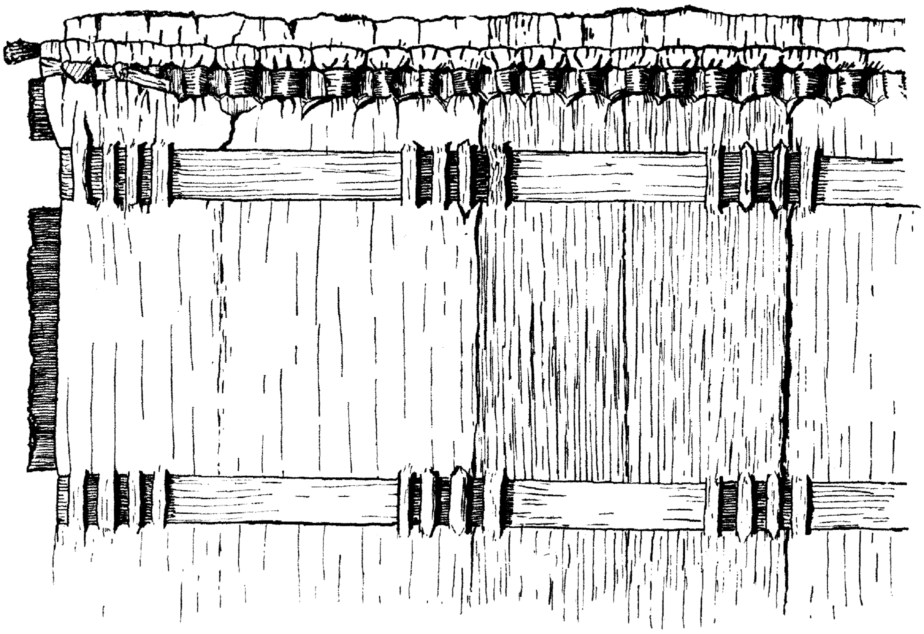

FIG. 41. EDGE OF EBON MAT.

The most elaborate of these unwoven pandanus mats known to me are those from the Caroline Ids. which in former times were frequently brought to these islands by the mission vessels from Micronesia. The leaves, as may be seen in Fig 42, or more distinctly in the diagrammatic Fig. 43, are arranged like clapboards transversely to the length of the mat, and are attached to each other as in the preceding example. The leaves, instead of being very broad, are in very narrow strips not over half an inch wide and are placed so closely that only about one-eighth of each leaf shows. As in the first example from Ebon longitudinal leaves serve both to give body to the mat and to bind the whole together. One can see that it would be difficult to roll up such a mat with the ends of these imbricated leaves bound to a stiff rim, and the maker has ingeniously surmounted the difficulty by trimming the ends of the leaves underneath for about one-third of an inch, the remaining portion being bound with pandanus leaf in several layers sewed on over and over with coco cord. The individual leaves are bound together by untwisted hibiscus fibre, and the whole structure is well adapted for rolling up. In use the unrolled portion is the bed, that remaining rolled up is the pillow, of which the shortest persons have the greater share. These mats are made in different sizes, as may be seen by the measurements of the few in this Museum:

Sleeping Mat or Lock No. 7835, 49×120 in.; from Ponape.
Sleeping Mat or Lock No. 3493, 16.2×120.7 in.; from Ponape.
Sleeping Mat or Lock No. 3492, 18×32 in.; fragment.

Among the fabrics of sewed pandanus are the fine kites of the Gilbert group. Like the Ebon mats already described and figured are the mat coverings for sails when furled, common where mat sails are used, as these sails are too heavy to be easily removed but are more conveniently covered while in the canoe. Models of these are in the Bishop Museum collection of canoe models.

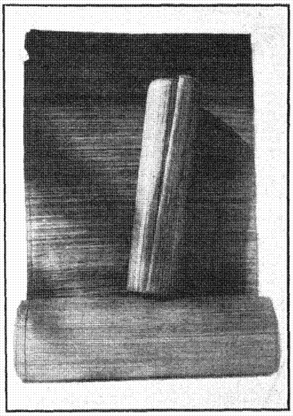

FIG. 42. MAT BEDS FROM CAROLINE IDS.

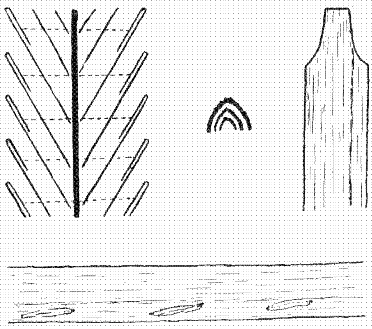

FIG. 43. STRUCTURE OF CAROLINE MAT.

Pillows = Uluna.—A simple work of the pandanus weaver were the very comfortable pillows made in the form of a parallelopipedon and stuffed usually with the harder parts of the same hala leaves. Strips ⅜ in. wide were usually used in the common forms, but in No. 1144, shown in Fig. 44, a much wider strip is used (⅞ in.) and ornamentation is added by the insertion of darker leaves in the finished pillow. In No. 1147, a specimen from Queen Emma's collection, double strips 1.2 in. wide are used. In Nos. 7732-33 the ends of the latter are of the usual ⅜ in. strip and plain, while the rest of the pillow is covered with narrow (⅛ in.) dark strips twilled to form ornamental zigzags or checkers. This covers the whole of No. 7732. After the pillow was woven it was embroidered with the dark strips by splitting the alternate longitudinal strips into three. In size these pillows vary considerably, as may be seen in the following table:

NO.	SIZE.
1144	10×6×4
1145	20×5.2×4.5
1146	10.5×6×3.5
1147	10.5×6×4
1148	13×5×4
1149	10.5×4.5×4
1150	19×5×6
1151	10.5×4.5×3.5
1152	8×3×4.5
1153	7.5×3.5×4.2
7732	9.5×4×3.5
7733	8.5×3.7×3.5

A small cubical pillow made in the simple pandanus weave served for a ball in the games of many of the Pacific islanders, and specimens from the Hawaiian, Gilbert and Caroline Islands are in the Bishop Museum. These were too light to be thrown to any considerable distance. Descriptions of the games played with these cubic "balls" must be reserved for the chapter on Ancient Hawaiian Sports.

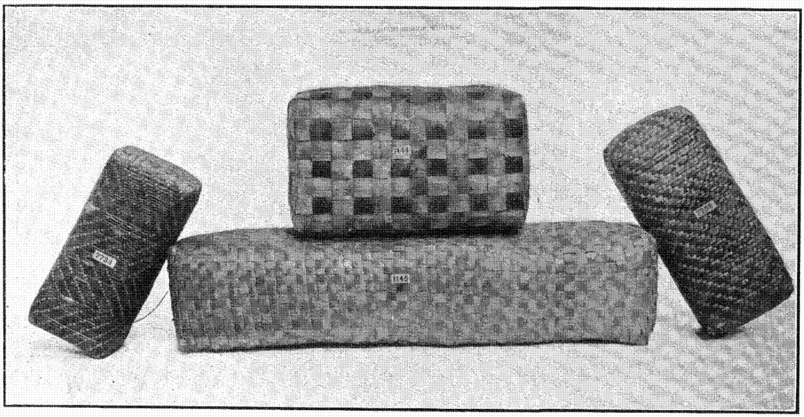

FIG. 44. HAWAIIAN PILLOWS.

Pandanus Baskets.—The method pursued in jumping from mat to basket may seem arbitrary, but, as those who take the pains to read through the present account of Polynesian basketry will see, there is no convenient partition between basket and mat; a basket is a folded up mat, or a mat is a basket opened out, especially in the forms most common in the Pacific. As I have grouped the products around the material rather than around the technical process that has been employed, I shall describe mats or baskets as these seem naturally to be in the line of succession.

Among the Hawaiians hala baskets were very common, and in most cases very ugly, as may be seen in the illustrations (Figs. 45–46). That they were found useful their continued manufacture to the present day testifies, and personal use of them convinces me that they are light and durable. In all cases figured the bottom was a square mat continued vertically to a round aperture without change of diameter in those shown in Fig. 45, the rim being turned and finished in the simplest manner. In the largest, which were used for storage, no handles were provided; in the others cords braided or twisted of coir, oloná or hau fibre crossed the bottom either diagonally or parallel to a side, passing between the weave on the outside once or twice or more, ending in two loops of suitable lengths for handles. In small baskets of this pattern a stiff handle of braid was often sewed to the sides near the rim, as shown in the figure. The dimensions of these baskets, from the specimens in hand, are as follows:

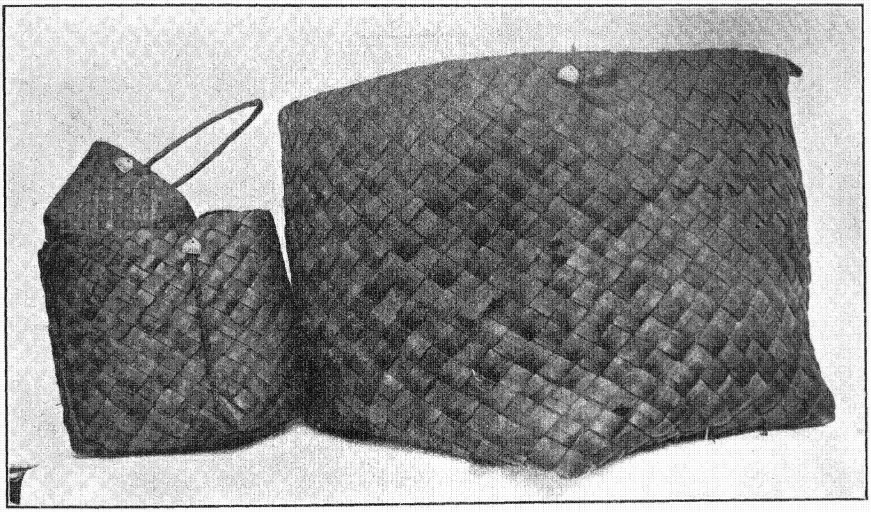

FIG. 45. HAWAIIAN PANDANUS (HALA) BASKETS.

4268. 4.5 in. ☐ base; 5 in. high; woven with 3/8 in. strips.
4266. 8 in. ☐ base; 10 in. high; woven with 1 in. strips; hau braid handles.
4255. 16.5×19.5 in. base; 17 in. high; woven with 1 in. double strip; no handles.
4267. 4.5 ☐ base; 6 in. high; woven with 3/8 in. strip; twisted handle.

The covered baskets of this material were even more flabby and shapeless. They were usually made smaller, and were used much as a modern reticule. They were made in the same form of palm leaf as has already been mentioned, and Fig. 46 shows three baskets of pandanus and one of loulu palm. In modern times this form is made only to sell to visitors, and is rarely seen in use. The baskets shown in the illustration are fair specimens, and I was told by old natives in the early sixties that these were genuine native patterns and not taught by the foreigners. It should be stated in passing that one great difficulty a student of basketry meets in our region where ancient specimens of this perishable ware are not to be found, is the number of braids and patterns taught the natives by foreigners with the laudable intention of improving their manufacture, or in other cases copied without instruction from articles in possession of foreigners. The beautiful flowers made from the stem of the *Tacca pinnatifida*, and the fans equally tasteful, made by the Tahitians, were not native conceptions but were taught by the French Romanist Sisters. The various straw braids used by the modern Hawaiians are another illustration of the foreign grafts. I cannot believe that the primitive forms shown in Fig. 45 are other than purely native invention, and for all I know those in Fig. 46 are equally so. Dimensions and brief descriptions of the baskets of this class in the Bishop Museum are as follow:—

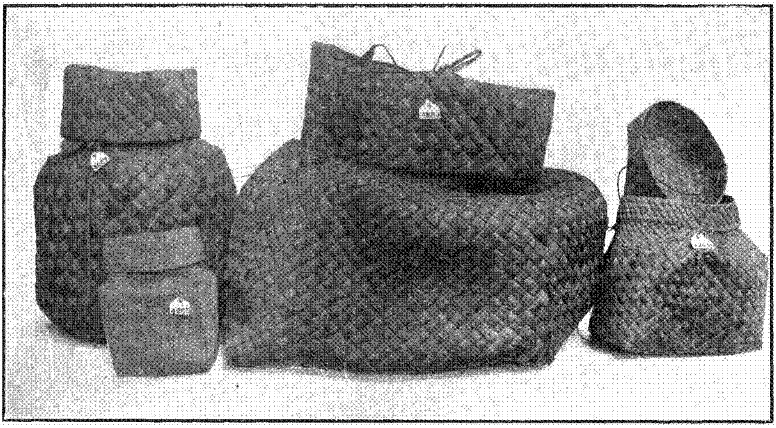

FIG. 46. HAWAIIAN COVERED PANDANUS BASKETS.

4256. Base 8.7 in. □; 12 in. high; cap 5 in. □; ⅝ in. strip doubled on itself to half size where the neck narrows. This is the common way of treating the neck weave and is found in all these examples except one (No. 4263). The handle is formed by a cord attached to the neck; the basket is sewed diagonally on the bottom.

4257. Base 7.5 in. □; 12 in. high; cap 5 in. □; strips ⅝ in.; body of double thickness of strips.

4258. Base 8 in. □; 9 in. high; cap 5.2 in. □; ¾ in. strip on bottom; ½ in. above; hau cord twisted, crossing bottom diametrically inside and up the sides to form the usual two-loop handle which passes through the cap, thus attaching that part to the basket as long as the cords are unbroken.

4259. Base 7.5 in. □; 7.5 in. high; cap 5 in. □; ⅜ in. strip; cords of oloná passed through sides near corners.

4260. Base 4.2 in. □; 8 in. high; cap 3 in. □; strips ¼ in.

4261. Base 6.2×5.5 in.; 7.2 in. high; cap 4×3.5 in.; strips ⅜ in. Single two-ply cord up opposite sides and through cap.

4263. Base 13.5 in. □; 14 in. high; cap 8 in. □; ½ in. strips shaved to half width in narrowing for neck. Cord of braided hau runs through the weave externally diagonally to the corners and up the sides; loose at base of neck and then through cap at the corners. The arrangement of cord handles is shown in the largest basket in Fig. 46.

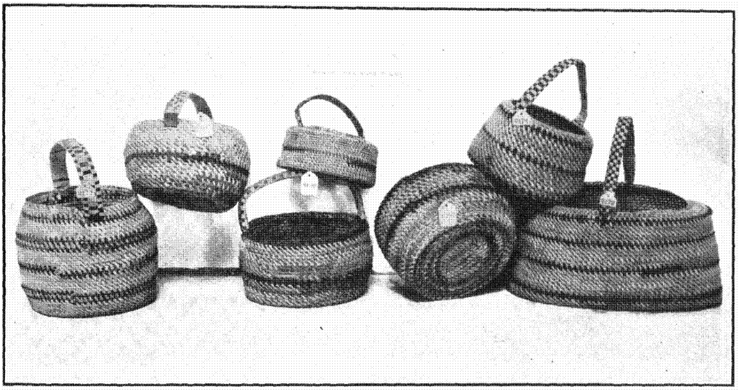

FIG. 47. SAMOAN ROUND BASKETS.

4262. Base 5.5 in. □; 7 in. high; no cap; peculiar as having a red embroidered triangle on each side, and a band of the same just below the neck.

A form of basket in the collection, usually called a fisherman's basket, is of like shape with these last, but has a stiff handle and two small cylindrical pockets attached to opposite sides, but I believe that this form is very modern, and of the three specimens within reach not one has been used. They do not seem well suited to their alleged use.

Samoan Baskets.—As may be supposed other Polynesians made use of pandanus in basket making, and many of those that have come to us are far more artistic than those made by the Hawaiians. At the same time it must be remembered that the examples of the handicraft of the latter are of old time and ancient form, while the illustrations that I shall give are almost all of very modern make by the Samoans and Micronesians, which closely resemble these. As I have reason to believe that the examples from the Caroline Ids., shown in Plate I, Nos. 8081, 4024, are at least close copies of baskets made by the ancestors of the makers of the specimens before us, it may be that the Samoans also copied more ancient examples; but my knowledge of the old basketry of the Samoans is too limited for me to form a just opinion on this. I am inclined to consider the round form of the Samoan basket the older, as it certainly is the cruder stage. This is a fair example of the deficiency of information on the basketry of the Pacific islanders. With the exception of the Hawaiians no serious attempt has been made so far as I am informed, to trace the stages in the basketry of the Oceanic groups; indeed there are few specimens of old baskets from the Pacific in any of the great collections. For that reason I feel justified in figuring the many non-Hawaiian examples, even if I can add but little to our knowledge of them and their place in basket chronology. The figures of Samoan baskets given by Turner[6] do not resemble any in this Museum, but the scale and want of detail may account for that. According to this learned missionary baskets of pandanus were made by the Samoans before they were taught by foreigners.

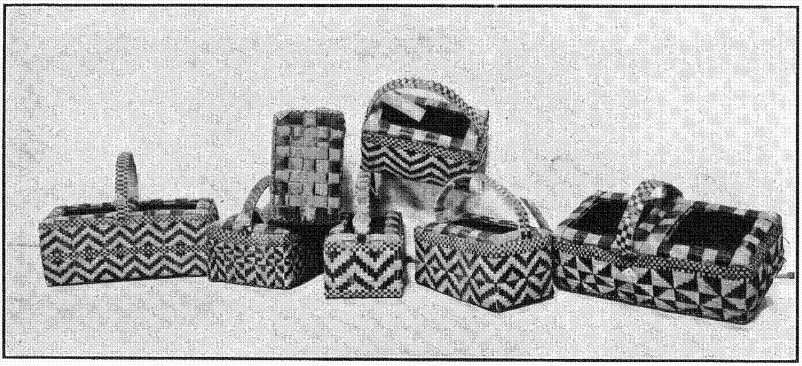

FIG. 48. SAMOAN SQUARE BASKETS.

All the round baskets shown in the figure are of coiled work, the pandanus (fala) being knotted instead of twined. The sizes of the baskets in this Museum are:—

2172. Base elliptical, 11×6.7 in.; 5 in. high; handle flat, checker work; there are four bands of dyed pandanus on the body.

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[6] Rev. George Turner, LL.D. Nineteen Years in Polynesia, London, 1861, p. 275.

2174. Base 5.7 in. round; 4.7 in high; three colored bands on the body.

2177. Base 6 in. round; 5.5 in. high; rather coarse work.

8190. Base 6 in. round; 3.5 in. high; a green band.

8191. Base 5.7×4.5 in., elliptical; 2.5 in. high; the ornaments and band of red and brown fau (hibiscus) fibre; for ornament portions of the foundation coil are simply wound with the strip and not bound to adjacent coils; handle twilled with red fau and fala.

8192. 6.2×5.5 in., elliptical; height 3.5 in.; two bands of purple fau on the body.

8193. Base 5.7×5.2 in., elliptical; height 3.5 in.; two bands of red fau on the body.

The last four are quite modern and were given to the Museum by Lieutenant W. E. Safford.

The rectangular baskets are of very different structure from the preceding. The coil is replaced by the plain plaited pandanus, and like the round baskets they bear in Samoa the common name of *ato*. The illustration shows both the form, the peculiar inturned edge, and the attractive decoration, but it does not show the double walls found in all of them. The strips are ¾ in. on the inner basket and edges, but on the exterior are much smaller. By the use of black strips a great variety of patterns is shown, but the black has a tendency to fade to a dull red. The sizes are as follow:—

2175. Base 10×5.5 in.; height 4 in.; divided into two unequal compartments.

2176. 11.2×5.5 in.; height 3.5 in.; divided in middle.

3566. Base 7.5×4.5 in.; height 3.7 in.

3567. Base 7×4 in.; height 3.2 in.

6734. Base 5.7 in. □; height 3.5 in.

6735. Base 7×4.2 in.; height 3.5 in.

7949. Base 6.2 in. □; height 3.5 in.

3564. A satchel of similar work and with a flap.

Before leaving the Samoan basketry we may glance at the testimony of several writers as to the methods used by the old Samoans, for they will not fail to throw some light upon the work in similar lines of their relatives on the other groups. It is also interesting to know that in Samoa the basket obtained a sort of vicarious divinity, for on Hawaii a number of gods (*e.g.*, Kukailimoku) were constructed of wickerwork, either plain or covered with feathers. Quoting the Reverend Dr. Turner[7], "Ga'e fefe was a war-god in some of the villages, and seen in a coconut leaf basket. It is said that in a battle between the gods of Samoa and those of Tonga the former crouched about the trunks of the coconut trees; but Ga'e fefe hid in a coconut leaf basket and escaped while many others were killed. Hence the *basket* became a sign of the god, and no one would step over such a thing, supposing the god might be in it. Hence, also, if, in going to fight, they fell in with a newly plaited coconut leaf basket turned upside down it was a bad omen, and sent them back. If, however, the basket was an old one, and not lying *across* the road, but to the one side, and 'fore and aft', it was a good sign and encouraged them to proceed."

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[7] Samoa a Hundred Years Ago and Long Before, p. 32. London, 1884.

To continue our quotations from the same author (p. 120) in regard to their mats, of which the technic has been recorded more fully, perhaps, than that of any other islanders, he says: "Their fine mats were, and are still, considered their most valuable clothing. These mats are made of the leaves of a species of pandanus scraped clean and thin as writing paper, and slit into strips about the sixteenth part of an inch wide. They are made by the women; and, when completed, are from two to three yards square. They are of a straw and cream colour, are fringed, and, in some instances, ornamented with small scarlet feathers inserted here and there. These mats are thin, and almost as flexible as a piece of calico. Few of the women can make them, and many months—yea, years, are sometimes spent over the making of a single mat. These fine mats are considered their most valuable property, and form a sort of currency which they give and receive in exchange. They value them at from two to forty shillings each. They are preserved with great care; some of them pass through several generations, and as their age and historic interest increase, they are all the more valued." Similar mats used as garments we shall find were made on the Hawaiian group, but of grass rather than pandanus leaf. A portion of one belonging to Kamehameha the Great is shown in Fig. 82, and though more than a century old is still flexible.

Another Samoan missionary, the Reverend John B. Stein, in speaking of Samoan mats tells us:[8] "Of these the most valued were the *ie taua*, and they might well be prized, since they often occupied five, six, nine and even twelve months in their making. They were made from the *lau ie*, a large plant whose leaves closely resemble those of the pandanus, but are larger. When plucked the prickly edges of the leaves were cut off with a shell, and the leaves then rolled up and baked in a native oven. This prepared them for a second process, which consisted of separating the inner or finer part of the leaf from the outer, the latter being laid aside for a coarser kind of mat.... The finer portions of the leaf were then strung together, fastened to a bamboo pole and placed in the sea, where they were allowed to remain until bleached, a process usually occupying from five to seven days, when they were rinsed in fresh water and placed in the sun to be further bleached, after which, when thoroughly dry, they were cut into little strips of various lengths and widths, according to the fineness of the plait required.

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[8] Old Samoa, London, 1897, p. 144.

"Upon the completion of one of these valuable mats....all the women familiar with the manufacture of these mats resident in the neighborhood were summoned on a given day to bathe the mat. On the women assembling they proceeded to wash the mat in fresh water, and after well stretching it out to dry they adjourned to the house to partake of a feast provided by the hostess to celebrate the completion of her mat."

How clear the picture of these children of Nature assembling on the bank of one of the many Samoan streams to wash the mat which, after perhaps a year's work, one of their number had finished! They all rejoiced, for was not the work an honor to their village, to their sex, to their friend? And if the customs of both children and domestic animals (dogs and pigs) were then as now, the washing must have been more than an idle ceremony. I am well aware that a Samoan house had a low fence across the doorways, intended to keep out pigs, for on this I have sat while chatting with the inmates of more than one Samoan grass house, both on Upolu and Tutuila; but I also know that in modern times at least it is customary to take the growing mat out under a shady tree where both pigs and hardly less dirty children could scarcely be kept from off it. The washing we may be sure was needed. Our author goes on to say:

"There were also at least thirteen other kinds of clothing, sleeping and house mats made by the Samoans.[9] Various dyes were prepared from vegetables and roots of trees. A beautiful crimson was obtained by mixing the inner bark of the root of the *nonufi'afi'a* (*Eugenia malaccensis*) with sea water and lime. Yellow was prepared from turmeric and oil. It was also obtained from the bark of the *nonu* (*Morinda citrifolia*) previously mentioned. A fine purple was obtained from the young shoots of the mountain plantain, *soa'a* (*Musa fehi*), and a brown by mixing the inner bark of the *pani* (?) with sea water. A black colour was imparted to various articles by burying them in the soft mud of a taro patch formed in a swamp."

Continuing our exploration of the technic of the islanders we find on Fiji, according to Dr. Berthold Seemann,[10] a most trustworthy authority, that "Mats with which the floors of houses and sleeping places are thickly covered, are made of two kinds of screw pines; the coarsest of the leaves of the Balawa (*Pandanus odoratissimus*, Linn.); the finest, of those of the Voivoi (*P. caricosus*, Rumph.). The Balawa, or Vadoa, as it is termed in some districts, is a tree twenty-five feet high, indicative of poor soil, growing in exposed positions, and being one of the first plants appearing on newly formed islands. Its singular habit has often been dwelt upon. The smooth white branches, with their dense heads of foliage, not inaptly compared to the arms of a huge candelabrum; the strong aerial roots, covered with minute spines, and serving as so many props; the curious corkscrew-like arrangement of the leaves, the leathery, sword-shaped leaves themselves, and their spiny edges; the long spikes of male, and the shorter branches of female flowers, their delicious perfume strongly recalling to mind that of the vegetable ivory of South America; finally, the bright orange-coloured drupes, formed into large heads of fruit, to say nothing of their insipid taste, appreciated only by natives, are all so essentially different from what a European traveler is accustomed to in his own country, that his attention is involuntarily arrested, and he hardly ever fails to record it. The Voivoi or Kiekie is a stemless species with leaves ten to twelve feet long, which delights in swampy localities of the forests, and is occasionally cultivated to meet the demand. Fans, baskets, and the finest mats—even those on which newly born babes, naked as they are for more than a twelvemonth, are carried—are made of its bleached leaves. Occasionally neat patterns are worked in by introducing portions of the material dyed black, whilst the borders of highly finished mats are tastefully ornamented with the bright red feathers of the Kula—a parroquet (*Calliptilus solitarius*, Latham) not found in the groups eastward of Fiji, and therefore highly esteemed by the inhabitants of those islands."

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[9] Some of these mats were laufau, lalaga, ie taua, ie 'ula, ie sina and si'aloa.

[10] Viti. B. Seemann. Cambridge, 1862, p. 554.

Turning to the westerly Pacific region, we find in the Solomon Ids., according to Dr. Guppy,[11] still another item in the technic of mat-making. I have not been fortunate enough to see any of the Solomon mats, of which there are a number in the Bishop Museum, that I could feel sure had been treated as Dr. Guppy describes; but his statement is interesting as adding to the methods used in preparing the pandanus leaves. He says:

"Mat-making is one of the occupations of the women of the Straits, the material employed being the thick leaves of a species of *pandanus* which is known by the natives as the *pota*. The leaves are first deprived of their thin polished epidermis by being rubbed over with the leaves of a plant named *sansuti*, which have a rough surface giving a sensation like that caused by fine emery paper when passed over the skin. The pandanus leaves are then dried in the sun, when they become whitened and leathery, and are then sewn together into mats." Evidently the kind of mat already described from the Solomon Ids., p. 32.

In the Gilbert Ids. we learn from the narrative of the United States Exploring Expedition under Wilkes,[12] "The mats are made of the leaves of the pandanus, slit into strips about a quarter of an inch wide, and woven by hand: these are of two colours, light yellow and dark brown: the former are made from the young leaves, and the latter from the old, which are prepared by beating them with a mallet to render them pliable. On the yellow mats they bestow a great deal more of their attention: the young leaves

[11] The Solomon Islands and their Natives, London, 1887, p. 61.

[12] Narrative of the United States Exploring Expedition during the years 1838–1842, by Charles Wilkes, U. S. N., Commander of the Expedition. Philadelphia, 1845. Vol. v, p. 94.

are laid aside for two or three days after they are plucked, till they are withered: they are then roasted by holding them in the hand over the fire, and afterwards laid in the sun for three or four days to insure them being sufficiently dried. During the latter part of the process they are brought every evening into the house to protect them from the dew or rain. When the leaves are sufficiently dry, they are left all night to bleach in the dew: they are then rolled up in balls and pounded with a mallet to render them soft and pliable, and when this is accomplished, they are slit with a shell and are ready for use."

It may be stated that the pandanus mats of the Marshall Ids. have long been an important article of commerce among the islanders, and the low coral islands of the group are largely dependent on the sale of their mats and the products of the coconut for such things as their low and sandy soil cannot produce. Hence these mats are found on most of the groups in the Pacific, and half a century ago they were often brought to Honolulu in the missionary vessels, and I have at times been led to suppose that they were of native Hawaiian manufacture. While the Hawaiians did make similar mats, those of the Marshall and Gilbert Islanders can generally be distinguished from most other products of the mat makers. The mat figured is one of the better class, and measures 11 ft. 2 in. by 9 ft., with a fineness of four to the inch. The dark and light leaves mentioned by Wilkes are very distinct, and by ingenious combinations yield very attractive mats.

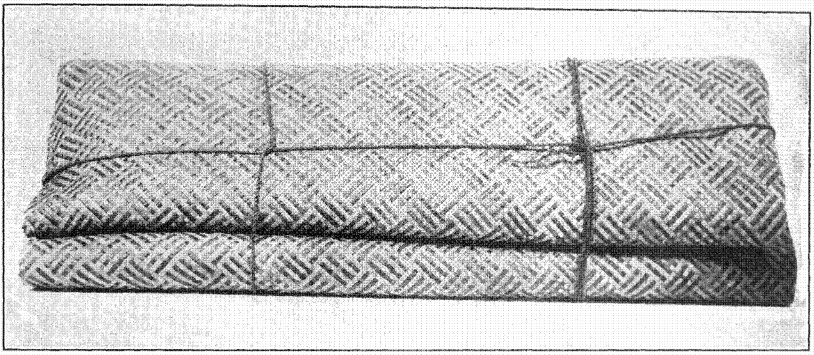

FIG. 49. MARSHALL ISLANDS MAT AS USUALLY FOLDED. NO. 8061.

The custom of keeping fine mats for a long time, using them only on great occasions, seems very ancient, and, if the word of some native Samoans may be trusted, mats several hundred years old are now in existence. The Samoan legend of the origin of one of these mats is sufficiently quaint to warrant its translation here, although it has been translated into German elsewhere.[13] I do not pretend to be a Samoan scholar, but the similarity with the Hawaiian has warranted me in translating the song from the text of O. Steubel.[14] There are expressions of which the meaning can only be guessed at, and even the learned translator into German, Dr. W. von Bülow, has not always been sure that he has guessed aright.

There are several versions of this story; the present one was collected at Safune, and Dr. von Bülow gives another not very different, in the volume referred to. The story is in genuine Polynesian form, and serves to explain the reverence with which certain fine mats are to this day preserved by the Samoans, wrapped in *siapo* and carefully stored among their choicest treasures.

O LE TALA I LE IE.

O Neefanua ma si ana tama o le pipili ma lona tuagane o Uu (Vaiuu) ma o Ololua (Lolua): ua sau la latou vaa mai Fiti ma lalaga mai i ai o le ie i le vaa.

Ua maua o le igoa o le ie o le Lagavasa.

Uua taunuu ai i Siuutu i Salailua, ua toe lalaga ona toe sauni lea a oo mai i le Itu o tane.

Ua lalaga o le ie, ua pipii ma le eleele.

Ona faaigoaina lea foi o pipii ma le eleele.

Ona fua lea.

Ua sau o le vaa i gatai o Safune.

Ua fai atu Uu, sei nofo o le vaa i tuaau, sei asia o le nuu nei po e i ai o se latou ava.

Ua alu ai Uu, ua tui le ava.

Ona alu ifo lea ona fai atui, oomai ia ua maua o le ava.

Ona alu ai lea o le vaa ua ofi i uta.

Ona fai atu lea Uu, oomai ina oo i uta: au fia nofo i si ou ava.

Ona ua nofo ai Uu ua faatupu maa i totonu o le ava, e i ai o le maa i nei onapo i le ituava sasae.

Ua alu ai o le vaa, ua tuuta i uta, ua taunuu ia Tugaga; ua tulia;

Ona alu ane e moe i le fuefue.

Ona toi igoa ai o le ie Ua moe i le fuefue.

Ona latou oo lea i le Ituvai i sasae, ua latou oo i Asu, ua lalaga foi o le ie: ua oo i onapo o le tuaoloa, ua agimai o le matagi, ua sau o le oneone i le fale, oneone ai o le ie. Ona tata lai lea o le ie, ua asuasu, ona faaigoaina lea o le maota o Asu, i le asuasu o le ie.

Ua oo o le malaga o le alii Lealatele o Tanuvasavasamanaia, ua afe i le fale o le Pipili i Safuné.

Ua avaga o le Pipili ia Tanuvasavasamanaia, ua fanau o Tualafalafa o le teine.

THE TALE OF THE MAT.

Neefanua with her daughter the cripple (hunchback) and her brothers Uu and Ololua came in their canoe from Fiji, and she plaited a fine mat in the canoe.

Then was given to the mat the name Lagavasa (woven on the high sea).

They made land at Siuutu in Salailua and wove the mat again and traveled to Itu o tane.

She wove the mat and the dirt clave fast to it.

For this was the mat named Pipii ma le eleele.

More leaves were to be collected.

The canoe went on to the seaward of Safune.

Then spake Uu, "The canoe must rest on the other side of the reef and a boat-passage must be found in the reef."

Then went Uu to pick out a boat-passage.

He returned and said, "Come, there is a boat-passage at hand."

Then went the canoe through the reef to the land.

"Now," said Uu, "Come, go you ashore while I stay by my boat-passage."

Then stayed Uu there and raised up a stone on the inner half of the entrance, that very night, a stone on the east side of the passage.

The canoe made land and was drawn up on the beach, it came to Tugaga; they went onward.

She went thence and slept in the bush.

From this was the mat called "Ua moe i le fuefue."

She went then to the east side of the stream, and turned to her mat-weaving again. Then arose in the night the southeasterly wind and blew the sand into the house so that the fine mat was full of sand. Then was the mat shaken: thence came the name of the chief's house, "Asu," from the shaking of the mat.

The chief Tanuvasavasamanaia of Lealatele was journeying and came to the house of Pipili at Safune.

Then Pipili married Tanuvasavasamanaia and bore him a girl, Tualafalafa.

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[13] Archives Internationales d'Ethnographie, xii, 136.

[14] Die Leute des Tagaloa, p. 144.

(Ua e i ai i nei onapo o le ala o le Pipili i Safune.)

Usu mai o le alii o Faitala mai Atua ia Tualafalafa, fanau Sina fafaga i tua. Usu ifo o Aoee i luga i le lagi ia Sinafafaga i tua, fanau Sinamaa Aoee.

Ona gasegase ai lea o Aoee, ona feauina ifo lea o Sina maa Aoee e alu ai i le gasegase o lona tama; ua faaputu toga ua ootai o le teine i lona tama, aua o le gafa ua ta i le lagi.

E i ai o le upu, "O le gafa ta i le lagi."

Ua fai toga. A ua muimui Tualafalafa, aua ua leai soona faitoga; a afiifii lava i le aluga o le ie, ua igoa tele.

Ua oo i le aso na tele ai toga, ona tatala loa lea o le ie:

Ua uila ma pogisa ma faititili ma afa sasa ia o le ie.

Ua ofo o le toatele o tagata, ua latou faaigoa ai o le ie ia Tasi e afe.

O le uiga o lenei igoa: Ua tasio le nei ie, a ua afe toga ua manai.

Ua tea i le lagi o le ie.

Sa tepa ifo nei o Sina maa aoee ia Tooalo i Manase, ua to tigapula, ua sili i le tua o se ie ula.

Ona tagi ai lea o Sina maa aoee i lona tama, ona oo ane i ai lea o tama toalua o Ale ma o Ua faafuasei late momolia o le teine i le alii, ua fia fai tane ai.

Ua to o Uafaafuasi, tago loa Tooalo, sei o le ie ula e tu i lalo o le maa, a tu loa o le teine o Sina maa aoee, ua tepa atu, ua leai o se ie ula; ona fesili lea o le teine:

Alii e, oifea o le alii, sa totoo lona tigapula?

Ua tali atu Tooalo; O au lava lenei.

Ona oso ai lea o le teine, o lea e au i le vai, a ua afisi i lona aoao o le ie.

Ua tatala o le ie, faa ua susu.

Ua iloilo, ua mago lava.

Ona faaigoaina lea o le ie ia Matumaivai.

Ua nofo Sina maa aoee ia Matilafoafoa, ua fanau o Sinataeoilagi.

Usu Tooalo ia Sinataeoilagi, fanau Sinaautuimo.

Usu mai Leuluialii ia Sinaautuimo, fanau Muliaga ma Matagitausulu.

Usu mai Tuisamoaia Matagitausulu, fanau Nonumaufele.

(There is to this day in Safune the street of Pipili.)

The chief Faitala mai Atua married Tualafalafa and begot Sina fafaga i tua. Aoee came down from heaven, married Sinafafaga i tua and begot Sina maa Aoee.

Aoee was ill, and Sina maa Aoee was sent down from heaven to cure the illness of her father: fine mats were collected, and the daughter goes to her father; so it was the genealogy towered toward heaven.

Thence comes the saying, "The genealogy is from heaven."

Mats were collected and Tualafalafa murmured because her mat had not assisted. Therefore was the mat with many names made into a pillow.

As now many fine mats were collected, the mats were lying unfolded.

Lightning and darkness, thunder and hurricane were the omen of the mat.

Astonished were the people, and they called the mat "One of a thousand."

The meaning of this name is: One is this mat, a thousand would balance it.

The mat so came to heaven.

Then looked Sina maa aoee upon Tooalo in Manase, he was planting a taro top and wore on his back a red (feather) mat.

Then did Sina maa aoee call to her father, and he brought two youths, Ale and Uafaafuasei, for the maiden longed to get the chief for a husband.

Then fell a sudden rain and Tooalo caught hold of his feather cloak and hid it under a stone; then at once stood the maiden Sina maa aoee before him and beheld him without the red cloak; then asked the maiden:

"O Chief, where is the chief who plants taro?

To her replied Tooalo, "I am he."

Then plunged the maiden into the water, and swam through the stream, taking the mat in her armpit.

Then was unloosed the mat, lest it be wet.

It was examined and found quite dry.

Then was the mat called Matumaivai (dry in the water).

Then Sina maa aoee dwelt with Matilafoafoa and Sinataeoilagi was born.

Tooalo married Sinataeiolagi and begot Sinaautuimo.

Leuluialii married Sinaautuimo and begot Muliaga and Matagitausulu.

Tuisamoa married Matagitausulu and begot Nonumaufele.

We can picture to ourselves the Samoan woman sitting beneath the shade on the bank of a stream singing this ancient song as she, too, tries to weave the fine mat which may be kept in memory of the maker long after her earthly pilgrimage had ended. The red mat in the song is supposed to be covered with the feathers of the Fijian *Calliptilus solitarius*, Latham, feathers greatly valued but not found on Samoa. The father of Sina maa aoee was the rain god, hence his sending of the lesser gods to pour the sudden shower which caused Tooalo to hide his precious cloak from the rain.

Mat Sails.—In the Director's Report for 1899 (p. 25) is an essay on the Mat Sails of the Pacific, by Mr. John F. G. Stokes, now Curator of Polynesian Ethnology in the Museum. This is a very complete and accurate compendium of what is known of the ancient sails, and as these were generally made of pandanus mat by a method of weaving differing from that used in the construction of the broad sleeping mats, we may quote here that portion relating to this work: "The sails throughout Micronesia were always made in strips varying in width from four inches to three feet, the Micronesians being particularly apt in this form of mat-making. The Marshall Islanders, who are among the most expert canoe builders and sailors in the Pacific, use a lapboard, cut from breadfruit wood, on which the mat is woven (Fig. 50). The board is arched and sets very comfortably in the lap of a person sitting on the ground. The

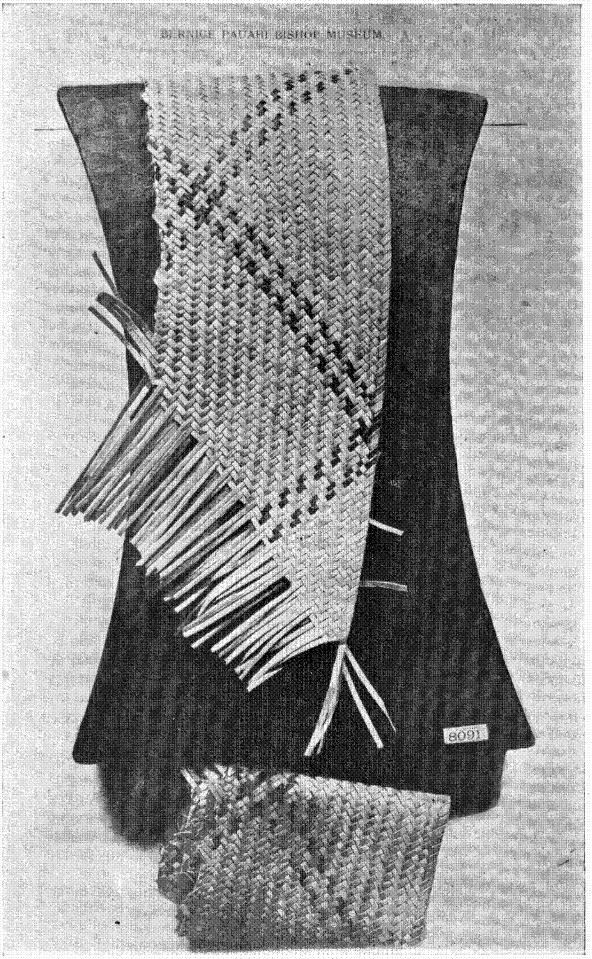

FIG. 50. LAPBOARD AND STRIP OF MAT SAIL.

strips of matting as woven are passed from the board and neatly rolled up. The strip of mat has four dark strands of dyed hibiscus fibre woven in on top of the usual strands of pandanus; this is a favorite method of ornamentation among the Marshall Islanders. The weaving commenced on the left side, and the strands were cut to about twenty inches in length, being long enough to pass around the three strands of pandanus used to form the border at the right and reach the left edge again, where after being woven in about half an inch, they were trimmed off. It might be noticed that at regular intervals along the left-hand border some strands were allowed to protrude; at this edge, as stated, the fresh strands were applied, and when secured four ends out of every seven were trimmed off, the three remaining butts being left to guide the weaver in inserting the black ornamental strands. This strip is 4.7 in. wide, while the breadth of the strands varies from 3/32 to 1/8.

"Having woven a great length of sail mat the strips were placed together with edges overlapping and sewed with a thread made from coconut fibre or twisted pandanus, the edges of the strips, on the edges of the sail being turned under and double sewed with the coconut fibre, which material is also used to bend the sail to the spars. A sail made in this fashion is very strong and will stand a great strain. It is about twice as heavy as an ordinary mat, and little heavier than canvas, and if wet becomes dangerous to use if suspended from the mast. The Micronesians, in a rain storm, prefer to lower the sail and roll it up in an envelope of pandanus or banana leaves which they generally carry for that purpose. The Hawaiian sail was made in strips, but that of Tahiti seems to have been composed of several large square mats sewn together, and could not have been a very strong combination. In all cases the work of weaving devolved on the women, while the men attended to the sewing and shaping of the sail."[15]

Narrow strips of matting like those made for sails were woven by the Samoan women for the game of *Lafoga* (pron. lafonga), in which it served as a sort of alley. These mats were about 7 in. wide and 17 ft. long. Two of these mats and a complete apparatus for playing this interesting game of skill are in the Bishop Museum, the latter the gift of Lieutenant Edw. E. Goodhue, U. S. N.

Satchels of Pandanus.—A form of pandanus weaving from Micronesia and Fiji must now be noticed, of which there are examples in most large museums. Four from the Gilbert group are shown in Plate II, Nos. 7096, 7095, 7094 and 3349, and there it may be seen that they are formed like the mats previously described from Ebon, of broad leaves which are split in places to receive the small black strips which serve both as ornament and binding.

I do not know the exact use of these satchels, and the carrying capacity of those from the Gilbert Ids. is very small. They come to the Museum labelled "Basket for books," and if this is their only use their origin must be recent, for it is not many decades that these islanders have had any books to put into them. On the other hand those of similar shape from Fiji are certainly ancient, some specimens in the old Marine Museum at Salem, Massachusetts (now Peabody Academy of Science) dating from the early years of the last century when the cannibals of that group had no books.

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[15] Occasional Papers, vol. i, no. 2, p. 26.

While all the satchels in this Museum from the Gilbert group are made of broad leaves sewed together and not interwoven, the embroidery of black or red strips being inserted by splitting the leaves as needed and after the basket is put together, those from Fiji are genuine mat work with broad strips, the embroidery being by the same method in both cases. In the Fijian satchel, No. 8198 (Fig. 51), the small strips inserted obliterate the irregularities left by the alternate raised and depressed squares in the weave of the satchel and leave a uniform surface. This is especially noticeable in the band along the upper edge. In the Fijian satchel the bottom and edges are continuous and not sewed as are the bottoms of those from the Gilbert Ids. There is a fine series of the Fijian satchels in the Salem Museum, better, I believe, than elsewhere. The dimensions of these satchels in the Bishop Museum vary considerably and are as follows:

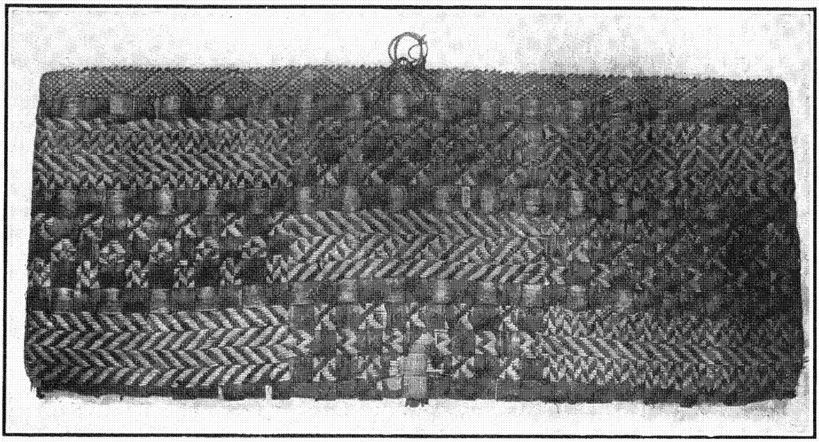

FIG. 51. PANDANUS SATCHEL, FIJI.

8349. 8.5×7 in.; coarse; upper border of finer mat work. Gilbert Ids.

7094. 6.7×6 in.; a continuous band sewed at bottom, and bound at top; red and black strips. Gilbert Ids.

7095. 12.5×6.5 in.; a double thick folio sewed only at bottom; has two bands of embroidery. Gilbert Ids.

7096. 11.2×9.2 in.; continuous band, sewed at bottom; two bands embroidered. G. I.

8198. 34×14 in.; woven with inch strips; inside plain; outside mostly covered with embroidery. Fijian.

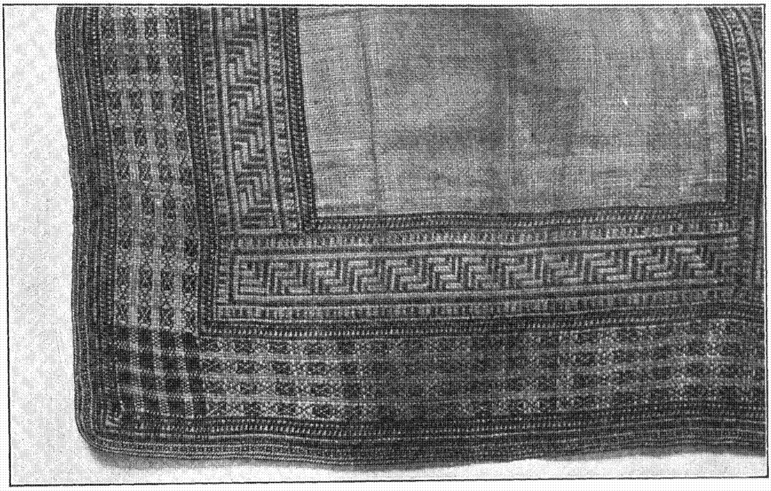

FIG. 52. MARSHALL ISLANDS MAT.

The Fijian specimens at Salem vary in length from 32 to 17 inches. In style of decoration they are well represented by the specimen in this Museum, already figured.

Mats for Clothing.—Although the Hawaiians certainly used mats for clothing, not only as wraps, but as waist cloth (malo), the principal development of clothing made of mat work, that is woven of grass or leaves instead of finer fibre, was on the Marshall Islands. The beautiful work of these islanders is familiar in all museums, and much has been written about their manufacture and use. I do not here intend to treat these mats from the point of the designer, for the various bands shown in the figures here given have names and appropriate uses. For all these I must refer the student to the most complete account known to me, that of Prof. Dr. Augustin Krämer;[16] but for the technic of the mat making I shall take the liberty of translating from this interesting paper. As the orthography of the names of the mats and their parts seems wholly unsettled, even German writers not agreeing among themselves, we may pass over the native names and their etymology. The illustrations given here of these mats are all from the Bishop Museum collection, except Plate V, which is made from a large mat long used as a table cover by the writer, who has thus had an opportunity to test the durability of these admirable mats. Nearly all here figured differ more or less from those figured by Dr. Krämer, and many of them are of considerable age.

I translate freely from Dr. Krämer, omitting much of the philological matter as, however interesting and valuable, foreign to our present purpose.

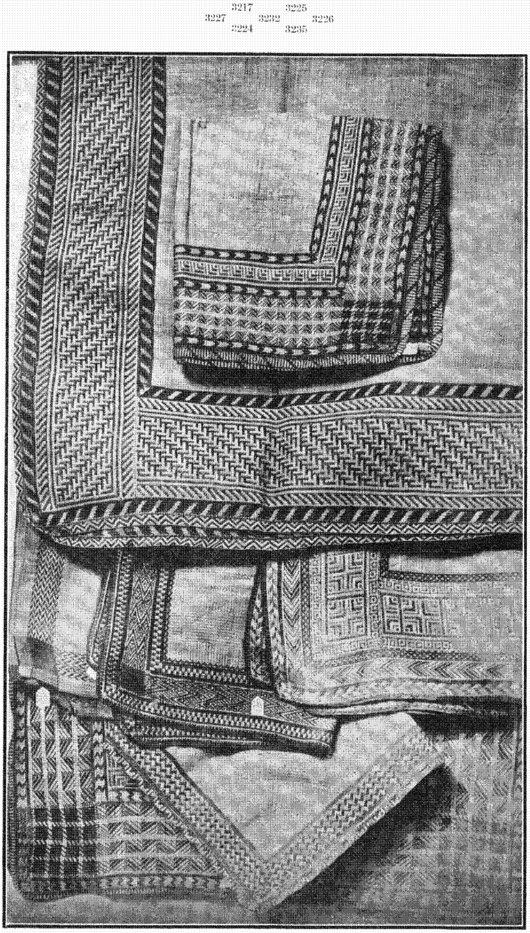

FIG. 53. GROUP OF MARSHALL ISLANDS MATS.

"Among the productions of the Marshall Islanders doubtless the mats used for clothing take the first place.... These were made freehand without apparatus or loom, only a long pointed weaving needle, called *oea*, generally from the long wing bone of the albatross, serves to lift up the strands which are woven on a lapboard of breadfruit wood one to two feet long and six to twelve inches wide, called *digenat*. [A similar one is figured in the section on Mat Sails, p. 46.] For the embroidery a needle of human, dog or fish bone; for trimming the leaves a pinna shell, *djabor*. All these things are kept in a basket woven from coco leaves called *bodjo*. For the mat the leaves of *Pandanus odoratissimus* are used. For the fine mats these are plucked young and roasted over a fire; for sails or coarse mats the older leaves are selected and left to dry in the sun, and then beaten with a hard mallet, *draggeinia*, of *Tridacna* shell [see No. 7832, Fig. 54]; the beaten leaves are rolled into bundles [like those shown in Fig. 38] and laid aside for occasion.

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[16] Die Ornamentik der Kleidmatten und der Tatauierung auf den Marshallinseln nebst technologischen, philologischen und ethnologischen Notizen. Archiv für Anthropologie, Neue Folge, Band II, Heft 1. Braunschweig, 1904.

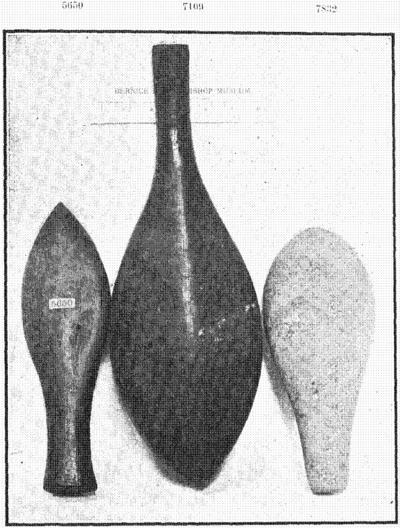

FIG. 54. MALLETS FOR BEATING PANDANUS LEAVES.

"When the weaving begins, leaves are taken four inches wide and three to seven feet long, and slit into strands which have various names according to their width, as *ajelar*, three fingers wide, *ajennen* thumb-breadth, *djelerik* still thinner (3/16–5/16), and *rua* the finest (1/16–3/32). The red fibres are from a creeper, *Ficaria ranunculoides*, called *adad*. The bark of the thinner shoots is stripped off, scraped and freed from the epidermis and dried; the bast then assumes a brown or reddish-yellow hue. The black fibres here, as on other islands, are from the bast of Hibiscus dyed with soot or mud. According to Finsch the black dye is obtained from the fruit of the mangrove. These are grated and boiled in marine shells or coconut shells and the bast is soaked in the decoction until the desired tint is obtained. For a red color the same strips are passed through a dye made of the root bark of a certain tree (*Morinda citrifolia ?*) with the addition of lime."

After describing the sleeping mats, which were arranged much as in Hawaii, the coarser weave at the bottom and the finer at the top of a pile often four to six inches thick, the bottom ones being sometimes of coco leaf, Dr. Krämer describes very fully the fine clothing mats, of which class we have illustrations before us. (Figs. 52-3.) It is unnecessary to go into the analysis of the ornament with the Doctor, but his explanation of the way of wearing these rather uncouth garments, which are fast giving place to the foreign cloth loose gowns, may well be noticed. There are two distinct ways of wearing them: either two mats, one in front, the other behind, are worn as aprons and fastened around the waist with a coil of the interesting coco and pandanus cord already described, a coil that is often sixty feet long (and Finsch reports one fifty metres long), or a single mat is passed between the legs and the corners brought over a similar girdle forming a sort of malo, an arrangement that would seem to preclude any rapid running by the wearer.

The thickness of the cord girdle increased with the rank of the wearer. There were also in these mats (called *ir*) patterns suited for men, others for women, some for commoners, others for chiefs, all of which Dr. Krämer fully describes. These mats were often given as presents, and in the early sixties some of the Marshall Islanders made a large one suitable for a bed cover which they sent as a present to Kamehameha V in recognition of the good done for them by the missionaries from his kingdom of Hawaii. On the voyage from Micronesia to Honolulu rats destroyed a corner of the elaborate border, and the partial ruin was purchased by the writer and is now in the Peabody Museum at Cambridge, Mass. When the use of mats for garments ceases, as it will very soon, it is questionable whether they will still be woven. For table covers they are well suited, as well as for other purposes of domestic ornament or use, and it would be a pity that they should be relegated to the class of lost arts. It cannot be denied that mat weaving here, as elsewhere in the Pacific, is rapidly declining, owing largely to the unwise method of instruction that has been in vogue throughout the Pacific where the methods of Anglo-Saxon education have been forced upon peoples generally unable to assimilate such intellectual food. If the white men had simply endeavored to make better specimens of the various races, saving what was good in their work, gently eradicating the heathen tendencies, it seems possible that many of the useful industries of the Pacific might have been saved from the list of abandoned arts. The pandanus and makaloa might still be fashioned into fabrics which would bring revenue to the makers and credit to the islands of the Great Ocean.

Hawaiian Lauhala Mats.—Enough has already been described of the methods of other Pacific islanders perhaps to render superfluous any minute description of the ways and means of the old Hawaiians in lauhala mat making. Doubtless it was the oldest form of mat making on these islands, and fragments are found in the most ancient burial caves quite like the mat work of the present day. No such work as that just described from Micronesia was made here, perhaps because the use of kapa for garments rendered their use for clothing unnecessary; but it must not be supposed that the old Hawaiians did not make fine pandanus mats, for there are sufficient witnesses to the fact in the cases of the Bishop Museum, where most beautifully regular and finely woven mats are in considerable number.

As to the legendary origin of Hawaiian mats I can give no information. Not only have the modern natives preserved no remembrance of the songs or legends of any such theme, but unfortunately the present writer neglected to take down from the lips of the old women who, in the middle of the last century, were singing such songs as they plaited the mats in the Puna caves, songs which undoubtedly related to their early predecessors in the mat making work; he also neglected to ask what were the tutelar gods of the craft, and today the remaining natives are unable or unwilling to give the ungathered information. We only know that the Hawaiians had among "the forty thousand and four hundred thousand gods" one or more especially worshipped by the pious artisans in basketry of former days. We also know that they had songs and legends of early mat or basket makers who were famous at their craft, and were perhaps apotheosized by their successors for their skill. The teaching of a new religion seems to have driven from their thoughts many things worth remembering while by no means strangling the superstitions of the neophytes. Their love for the recital of *mele*, which was quite oriental and kept alive in their memories the doings of their forefathers, their genealogies, and the rules of life, has largely disappeared from this group, and aimless political discussion or modern tales of a very different nature have usurped its place.

Leaving then the folklore and poetry of the basket and mat makers untold, we must present their work, which is so like that of all the other Polynesian groups that it hardly deserves an extended paragraph. The hala leaves were gathered, they were dried either in the sun or in the cover of the house, were scraped, trimmed and beaten, then rolled and stored until enough and more had accumulated for the intended mat. The shell trimmer was that used everywhere, but the mallet was not like those figured from the Marshall Islands (Fig.54), but either a plain round club (*hohoa*), or more commonly an old kapa beater (*ie kuku*), of which the engraved sides had become smooth from long use. These four-sided clubs with rounded handles were common all over the group, as they were necessary utensils in every family, and they are to be found in most ethnological museums.

I have asked a skilful maker of lauhala mats, still resident in the once famous mat making district of Puna, to make for me the first few inches of a common mat, and the result is shown in Fig. 55. To show her good will as well as skill she has embroidered her own name and address on the obverse of the figure, and my name on the reverse; but in spite of that fancy the specimen shows perfectly well the beginning of the weaving. No vestige of a loom, not even pegs to hold the row of leaves in place is needed, but a sufficient number of hala leaves is taken to cover the width of mat desired, and these are strongly sewn together as shown in the figure. The splitting into strands of the selected width is then done and the plaiting begins. Each strand passes diagonally to the edge of the growing mat and then turns and continues its journey at right angles to its former course until it reaches the other side, or is continued by a succeeding strand which is neatly inserted under the overlapping transverse strand. The skill with which the weaver keeps the long strands from hopeless entanglement and puts each in its destined place is surprising to the uninitiated. To the success of the mat the weaver's fingers must put the right tension on each strand or the mat will be bellied or warped, and will not lie flat or be rectangular when finished. An inexperienced or careless mat maker is always known by the irregular mat. While the whole leaved edging is sometimes left on the finished mat, it is usually cut off when the distal end has been bound in.

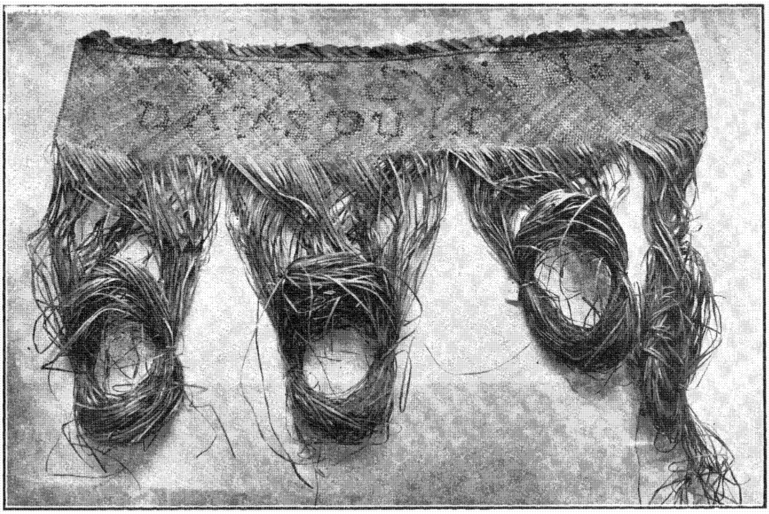

FIG. 55. THE BEGINNING OF A MAT OF LAUHALA.

The size of these mats was unlimited, except by the use to which they were destined. Often they extended quite across the house, and when intended for covering canoes might be eighty to a hundred feet long. Long and narrow ones were used for a table at an *ahaaina* or feast; a moderate sized one in the Bishop Museum, made for this purpose, measures 3 ft. in width and is 28.7 ft. long (No. 2583). It was not uncommon to weave in coarser mesh or strand immense mats to spread on the ground for seating a large company, and I have seen in old native churches mats many yards square covering the whole floor, there being no pews or seats of other nature. From their size and weight they were seldom removed, and often became unsanitary, according to modern ideas.

The bed mats have been several times referred to, but they may be more fully described here as a series of mats woven, in the best houses, to fit an allotted place, and arranged in accordance with their fineness from the coarsest, which rested on the gravel floor of the house, to the fine mat on top that showed the wealth or taste of the owner. To keep the mats in place (and as the whole family slept on the same bed, and some of the bedfellows might be uneasy from overfeeding, this was no simple matter) mats of the *hikiee* were sewed together along one edge, and this edge generally raised by the interposition of strips of the same matting.

Matting of the lauhala in coarse weave, one inch strands or larger, were in constant use to cover property from the sun or sudden showers, to spread nuts or herbs upon while drying in the sun, and to wrestle on in an indigenous form of that manly exercise, where the contestants clasped hands and, without touching any other part of the body, endeavored each to push the other off the mat. In the early days of the American Mission on these islands the simple homes of the missionaries were generally carpeted, if at all, with lauhala mats woven to fit the room, and examples are still extant of mats of great beauty given by early converts to their respected teachers.

New Hebridean Dresses.—On several of the islands of the New Hebrides, a group using the loom, and famous for fibre weaving, are found dresses of finely cut pandanus, so closely resembling grass work, that until the material was considerably magnified the author was inclined to class them with the makaloa mats of the Hawaiians. As will be seen in Fig. 56, they are aprons of no generous size (some are hardly two inches wide), but the peculiarity of their openwork weave recalls the Tongan mats of the opposite side of the Pacific. These aprons are worn by the women by means of some sort of belt, and on some of the islands are stained a magenta red which does not add to their beauty in the eyes of a foreigner, and almost conceals the openwork patterns. Some of those from Malekula have been washed until the pandanus fibre is broken and roughened. The following list of women's dresses from Malekula, Oba and Ambrym shows the difference in size:

8143. 3.2 ft.×10 in.—16 strands to inch. Malekula, twilled weave, no coloring; Fig. 56, No. 3.
8144. 3 ft.×9 in.—15. Malekula, plain weave; Fig. 56, No. 1.
8145. 3 ft.×11 in.—14. Malekula, twilled; Fig. 56, No. 2.

8447. 3 ft. long × 9 in. wide—20 strands to inch. Oba, with various openwork designs at ends, and stamped with magenta stain.

8448. 3.2 ft. long × 9.5 in. wide—20. Oba, like last, short fringe on edges, long on ends.

8449. 1.5 ft. long × 3 in. wide—26. Ambrym, broad red stripes, openwork ends, with long (10 in.) fringe.

8459. 3.7 ft. long × 1.7 in. wide—21. Ambrym, all red, two sewed together in the middle, ending in four braided tails and long fringes.

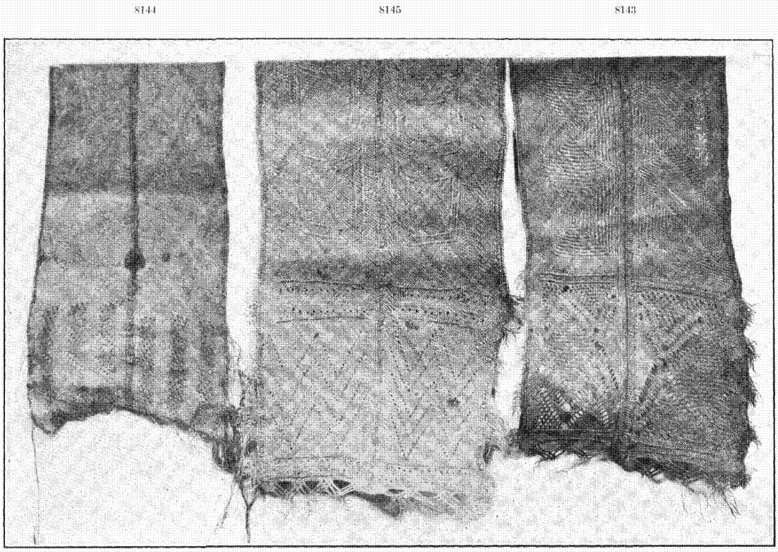

FIG. 56. WOMEN'S DRESSES FROM MALEKULA, N. H.

6627. 3.5 ft. long × 10.5 in. wide—15. Oba, openwork ends, stamped purple all over, fringes.

6628. 3.6 ft. long × 11.5 in. wide—16. Oba, same treatment as last.

Fijian Coffin.—This remarkable specimen of basket work is 22.5 in. long, 9 in. wide in the middle, 5.5 in. at the ends, and 9 in. deep. The bottom is wholly of breadfruit wood, and the cover is lined with the same material stitched with pandanus strands to the upper edge. The interior is lined with a plain broad weave of pandanus extending above the external rim by a foundation of two splints bound together by pandanus strips; this forms a hold for the cover. The illustration (Fig. 57) shows what is really the distinction of the whole work, the beautiful design covering the exterior. Whether this coffin-shaped basket was really intended for the use its name would imply may be doubtful; certainly in this connection it is unimportant; the remarkably effective design of the basket work is all in all. The technic is simple, a vertical series of small black strips of uncertain origin form the more conspicuous trellis, over and under which pass portions of the close band of light brown grass-like strips forming the design. Between two bands of zigzag is a much broader band of diaper work; the upper rim, which serves also as support for the cover, is a braid of black rattan strips. The design of the cover is not so successful. The vertical portion repeats the zigzag band of the basket proper, but the top is covered with a longitudinal band of diaper with two zigzag narrower bands on either side, with partings of subsidiary bands of a dark brown weave. Whatever the purpose of this basket we may be sure it was intended to hold something very precious, and I must doubt, in view of the light esteem in which infants were held in ancient times throughout the Pacific, that it was intended to hold the decaying remains of any baby, even the offspring of the highest chiefess.

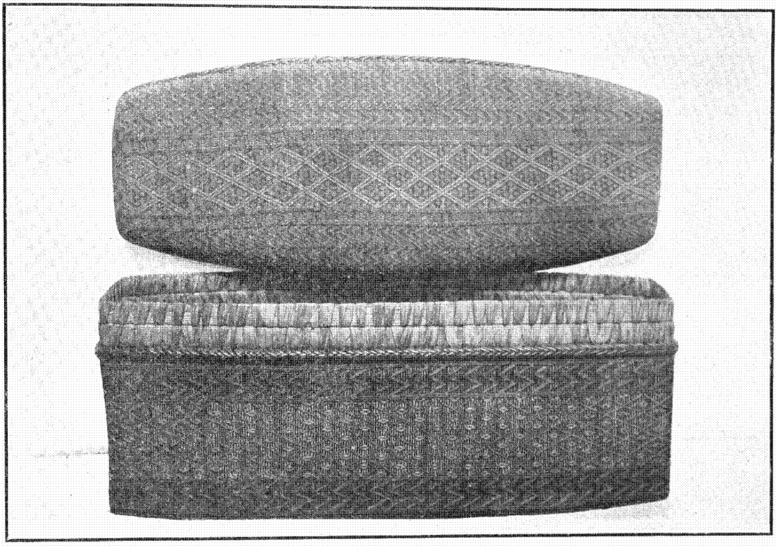

FIG. 57. FIJIAN COFFIN-SHAPED BASKET.

List of Pandanus Mats in the Bishop Museum.

2580. 7.2 ft.×4.7 ft.—16 strands to inch. Very fine and flat weave. Hawaiian.
2581. 34.3 ft.×10.5 ft. Hawaiian.
2582. 10 ft.×7.2 ft. Hawaiian.
2583. 25.7 ft.×3 ft. Dining mat. Hawaiian.
2586. 6 ft.×4.7 ft. With diagonal stripes. Hawaiian.
2591. 18.2 ft.×8 ft.—16–12 to in. Very flat weave. Hawaiian.
2598. 11.5 ft.×7 ft.—7–8. Hawaiian.
2599. 10.7 ft.×8 ft.—6. Hawaiian.
2602. 8.3 ft.×8 ft.—7. Hinano = young leaves, Puna. Hawaiian.
2603. 9 ft.×7.7 ft.—3. Hawaiian.
2780. 10 ft.×6.5 ft.—4. Checkered. Rotuma.
2781. 10.5 ft.×6.5 ft.—4. Diagonal brown stripes. Rotuma.
2782. 10.5 ft.×8.5 ft. Hawaiian.
2783. 10 ft.×9 ft.—4. Hawaiian.
2784. 11.3 ft.×8 ft. Old. Hawaiian.
2785. 10 ft.×9 ft.—7. Hawaiian.
2786. 12.2 ft.×7.5 ft.—6–7. Flat weave. Hawaiian.
2787. 6 ft.×4 ft.—5. Brown in patterns. Hawaiian.
2788. 5.5 ft.×4.7 ft.—5–6. Diagonal brown stripes. Hawaiian.
2789. 9 ft.×6.3 ft.—12. Hawaiian.
2791. 8.5 ft.×5 ft.—15. From Queen Emma collection. Hawaiian.
3239. 5.6 ft.×3.8 ft.—6. Black and white checks and twills. Niuë.
3240. 6.2 ft.×5.1 ft.—4.5. Black and red zigzags. Niuë.
3498. 9.5 ft.×5.2 ft. Leaves of two colors. Gilbert Ids.
3499. 4.8 ft.×4.2 ft. Gilbert Ids.
3500. 6 ft.×4.5 ft. Two colors with long suture. Gilbert Ids.
3501. 11.7 ft.×7 in.—9. Fringed belt, black stripe. Samoan Ids.
3505. 6 ft.×5.7 ft.—13. Fringed. Hawaiian.
3506. 8 ft.×5 ft. Hawaiian.
6310. 14.5 ft.×13.5 ft.—2. Embroidered with red. Tongareva.
6311. 8.3 ft.×6.5 ft. Strips of leaf sharply cut. Tahiti.
6629. 10 ft.×8 ft.—6. Mrs. Bishop's collection. Hawaiian.
6630. 6 ft.×3.6 ft.—6.—Mrs. Bishop's collection. Red border. Niuë.
6631. 8 ft.×7 ft.—10. Mrs. Bishop's collection. Single leaf. Hawaiian.
6632. 6.2 ft.×5.9 ft.—10. Mrs. Bishop's collection. Embroidered black and brown. Marshall Ids.
6655. 5.8 ft.×4.5 ft.—16. Irregular serrate edge, fringed leaves on ends. Samoa.
6657. 7.4 ft.×4.6 ft.—12. Double black transverse stripes. Gilbert Ids.
6659. 4 ft.×2 ft.—10. Fringe on all sides, embroidered with wool. Tonga.
6660. 5.2 ft.×4 ft.—6. Niuë.

6661. 4.5 ft.×2.6 ft.—5 strands to inch. Fringed on surface also.
6662. 5.7 ft.×1.2 ft.—14. Twilled belt, open edging on ends. Santa Cruz.
7718. 11.5 ft.×9.5 ft. Hawaiian.
7755. 2.2 ft.×1.8 ft.—4. Samples made in 1834. Hawaiian.
7962. 13 ft.×10 ft. Hawaiian.
8061. 11.1 ft.×9 ft.—5. Marshall Ids.
8444. 6.5 ft.×2.5 ft.—9. Fringed with feathers. Tonga, N. H.
8445. 10.5 ft.×22 in.—9. Fringed on long edge. Tonga, N. H.
7729. 9.8 ft.×7.5 ft. Hawaiian.

Pandanus Mats from the Marshall Islands.

These are all embroidered around the border with hibiscus fibre, black and red-brown; the smaller sizes are used as aprons.

3215. 2.2 ft.×2.1 ft.—11 strands to inch. With hau trimmings. Maloelab, 1839.
3217. 6 ft.×6 ft.—11.
3218. 6 ft.×5.5 ft. Narrow border.
3219. 6 ft.×6 ft.—11. Remarkably wide border, mostly black.
3220. 5.5 ft.×5.5 ft.—11. Wide border, mostly black.
3221. 6 ft.×5.5 ft.—11. Narrow border.
3222. 5 ft.×6 ft.—12.
3223. 6 ft.×6 ft.
3224. 3 ft.×3 ft.—11. Wide border, mostly red-brown.
3225. 3 ft.×3 ft.—9.5. Wide border. Fig. 53.
3226. 2.7 ft.×2.7 ft.—10. Wide border. Majuro. Fig. 53.
3227. 2.7 ft.×2.7 ft.—11. Narrow border not extending to the edge. Fig. 53.
3228. 2.7 ft.×2.6 ft.—9. Wide border.
3229. 2.9 ft.×2.9 ft.
3230. 2.7 ft.×2.7 ft.
3231. 2.7 ft.×2.7 ft.—10. Narrow border, mostly black. Fig. 53.
3232. 2.7 ft.×2.5 ft.—10. Narrow border. Fig. 53.
3233. 2.5 ft.×2.5 ft.—10. Narrow border.
3234. 2.7 ft.×2.2 ft.—11.
3235. 2.2 ft.×2.2 ft.—10. Fig. 53. Only one with diagonal weave.
3236. 2 ft.×2 ft.
3237. 2 ft.×2 ft.
3238. 5.3 ft.×5.3 ft. Medium border.
6656. 6 ft.×5.9 ft.—12.
6663. 12.7 in.×7.7 in.—12. Satchel, embroidered like the mat border.
6664. 11 in.×8.7 in.—12. Satchel, embroidered like the mat border.
7563. 3 ft.×3 ft.—9. Mat with wide border.

Baskets of Ieie.—We are now to consider one of the two most distinctive Hawaiian works in basketry, and one which, for solidity and durability of workmanship, I believe to be unsurpassed in this Pacific region, nor do my limited studies in the field of basketry embrace any baskets of any region which may justly be accorded a higher rank than pertains to the baskets made from ieie by the Hawaiians. Unlike the pandanus, its near relative, the Freycinetia does not offer in its leaves its most useful product, although these are similar in shape but smaller in size than those of the pandanus. It is a slim, scandent plant, either making dense jungle with its partly recumbent stems, or climbing high among the trees where its tufts of green leaves enclosing in the flowering season the bright red flowering leaflets, among which the three flower heads rise, always attract the eye of an observant traveler. From the slender stems perpend long rootlets of almost uniform diameter which cling to the

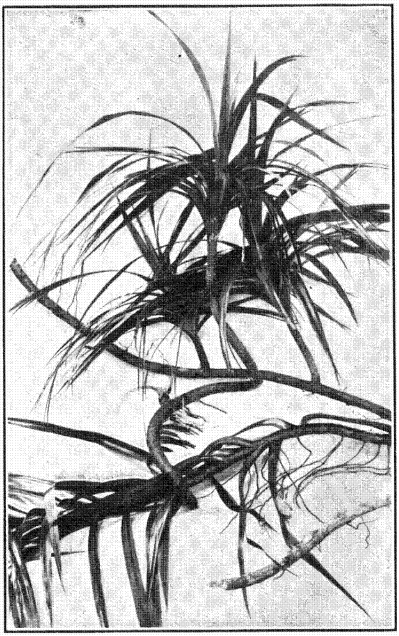

FIG. 58. FREYCINETIA LEAVES.

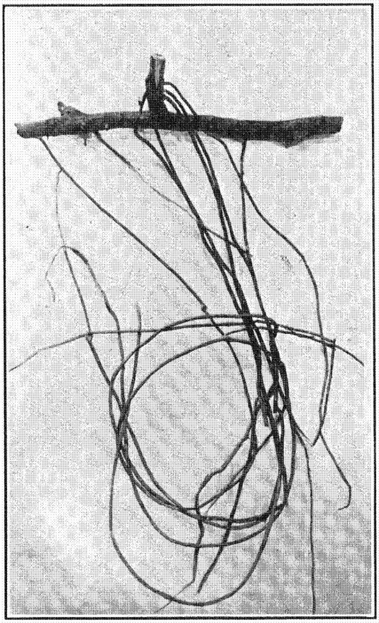

FIG. 59. FREYCINETIA ROOTLETS.

trees or swing freely in the air. Fig. 59. Slight and flimsy as these rootlets appear they are the all-important product of the plant.

> Hanau ka ieie hihi i ka nahele.
> Born is the tangled ieie in the forest.

is a common saying of the old Hawaiians, for the plant is found in abundance in the forests, especially the more elevated ones, all over the group. It is also found on other Pacific islands, the name ie, or ieie, extending through Polynesia. The Maori ikiike, or kiekie (*Freycinetia banksii*) is the same word.

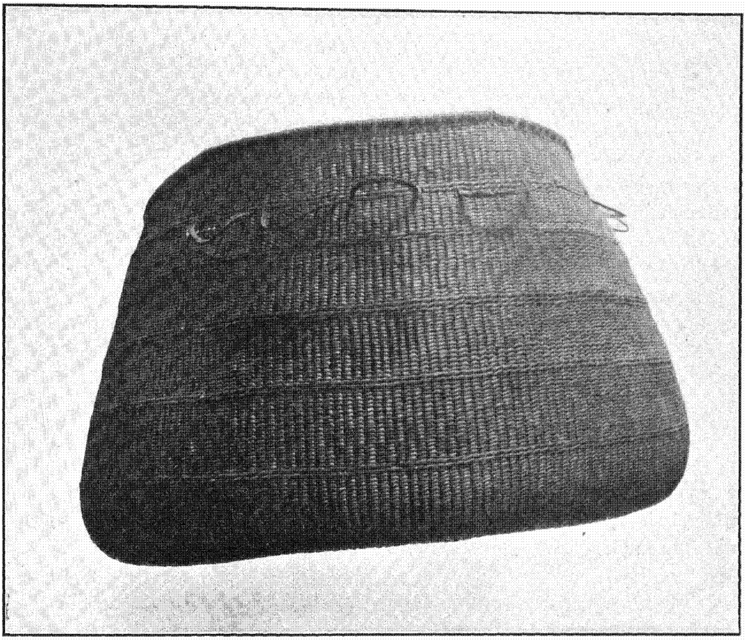

FIG. 60. BASKET OF IEIE. SEE PLATE VII FOR COVER.

In the days of idol worship the ieie was used for decorating the idols, and at the present day the word is applied to a person decorated with lei or wreaths. For general rustic decoration it is also very fit, as it does not soon fade nor drop its leaves. Ornamental it will always be, but its usefulness seems to have departed from these Hawaiian Islands, for no longer are the baskets made that attracted, alone among the basketry of the Pacific, the wonder of early visitors. There may still be a very few specimens stored in the closets of some old residents, but I know of none in any museum except the two complete with one coverless specimen in this Museum, and I shall therefore both describe and figure these most carefully.

There is little to say about the preparation of the rootlets: they were sometimes split in halves and sometimes used whole. The structure is rather peculiar and serves to distinguish this material from the many vines of the Convolvulus family that have a somewhat similar appearance. In the centre are five or six tubes which give elasticity to the strips; the ferns having in section a harder tissue of horseshoe shape.

In illustrating the finest basket of this material that the Museum possesses we find difficulty in distinguishing the two colors which were once very distinct, since age has so browned the light color of the natural stem, and so faded the deep purplish black of the contrasting portion, that while the eye with difficulty makes the distinction, the photographic plate has failed to do so, except in the middle of the second band from the bottom. Fig. 60 shows the body of the basket, and Plate VII the cover, the basket belonging to what we may for convenience call Class I. The full description is rather dull reading to any but an expert in basketry, but is worth giving, there are so few specimens left, and time must destroy these.

No. 7651. Diameter 26 in., height 17 in. Specimen in good condition, except that the cover is cracked all along the upper rim, and several of the side cover loops are gone. Starting from the rim, which is of course reversing the order of manufacture, this rim is flat, consisting of two rods carefully clothed with flat strip, every fifth and sixth one going down under two horizontal twisted rounds in which the strips pass over two of the upright strips. Then a band of dark and light strips, originally light brown and black, 16 rounds of two-ply over uprights of 3 rods each; 2 rounds twisted, followed by 12 plain brown; 2 twist, variegated band of 17 rounds; 2 black twists and 1 brown, 16 brown and 2 twists; sides then turn in to form bottom with a variegated band of 16 rounds, 1 brown, 1 black and 1 brown twist; 11 variegated rounds, 7 brown rounds, 3 brown twists; 15 brown rounds, 2 twists; 10 brown rounds followed by 7 twists to centre of start. There are 19 braided sennit loops to attach cover. Cover is formed with the same kind of rim, 2 twists, 2 black, 7 brown rounds, 1 twist; 19 variegated, 2 twist, turning edge; 18 brown rounds, 2 twist; 25 variegated rounds, 12 twists; 8 brown and 2 black twists; 12 twists to centre. This basket, supposed to have come from the island of Hawaii, was many years in the cabinet of the A. B. C. F. Missions in Boston.

No. 6589. This basket is plain brown without color decoration, 17 in. in diameter and 10 in. high. The rim is similar to the last, but has three bars as a foundation instead of two. The succession from the rim is as follows: 2 twists, 10 rounds;

2 twists, 19 rounds; 2 twists, 17 rounds; 2 twists, 17 rounds on the bilge; 2 twists, 18 rounds; 2 twists, 12 rounds; 7 twists to centre. The cover rim has one rod and the binding strip attaches it to the two succeeding twists, by the sixth and seventh round some go over both twists, others over only one. Then come 12 rounds, 2 twists on the edge of cover; 12 rounds, 2 twists; 14 rounds, 2 twists; 11 rounds, 2 twists; 6 rounds, 4 twists to centre. The label which came with this specimen reads as follows: "This was originally the property of Mrs. Coan, of Hilo, Hawaii, but it has been in use in the family of Mrs. S. N. Castle, of Honolulu, for over fifty-five years, and is given by her to Mr. Brigham for the Bishop Museum."

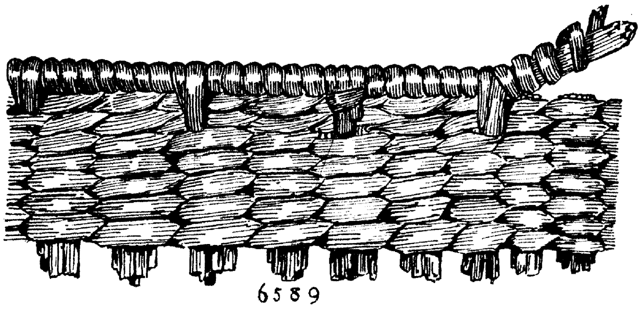

FIG. 61. EDGE OF BASKET NO. 6589.

No. 6942. Diameter at bilge 18 in., at rim 12 in., height (without cover) 9.5 in. The rim is composed of five small rods bound and attached in a way similar to those in the two preceeding specimens, but with less regularity. The sequence is 2 twists, 10 rounds; 2 twists, 20 rounds; 2 twists, 15 rounds; 2 twists, 15 rounds on the bilge; 2 twists, 13 rounds; 2 twists, 15 rounds; 3 twists, 11 rounds; 8 twists to centre; no cover extant. The outside has been painted all over a lead color, but the inside is fresh and unstained. Specimen from the curious old stone house at Kailua, Hawaii, built by Reverend Asa Thurston (arrived 1820), and was used by the Thurston family there and elsewhere for seventy-five years.

These three are the only surviving specimens belonging to this class of ieie baskets that are known to the writer. The length of time these have been in use is remarkable, and shows the great strength and durability of the material. The three are of the same general pattern, and might have been made by the same hand; the perfection of the work seems to show that there must have been many made before such skill could have been acquired.

The next class comprises the fine baskets woven over wooden umeke or gourd calabashes or bottles, and several very fine specimens are in the Bishop Museum. Exactly how these were made I cannot say, and the technic must be gathered from the specimens, for in the early days of my explorations on this group I never saw any such baskets, and have not been able to learn much about them from the present generation of natives. It seems to have been the only basket figured and noticed by the early explorers, and Freycinet makes a curious mistake in the material used. It seems worth while to quote his account:

"On fait avec la feuille du ti, quelques ouvrages dans le goût de ceux de nos vanniers, mais peut-être mieux finis; les uns sont d'une seule teinte; les autres, tels que les casques, les éventails, les panniers, le clissage des calebasses où l'on serre les effets precieux, &c., sont nuancés de couleurs diverses. Ces ouvrages, confiés aussi à la main délicate des femmes, offrent des formes et dimensions très-variées.'[17]

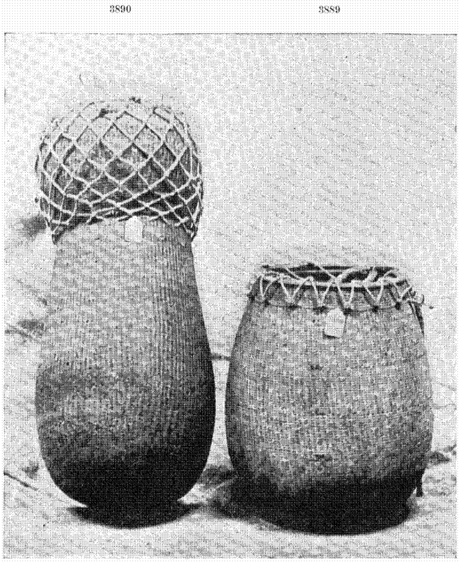

FIG. 62. HINAI POEPOE.

What the French Commander took for the leaves of the ti (ki, *Cordyline terminalis*) was afterward named for him *Freycinetia*, and the figures given in Freycinet's report leave no doubt that the baskets we are now considering were the ones referred to in the quotation. As he says, these hinai poepoe were used as receptacles for their greatest treasures, and we know that when the breakage of the interior umeke or calabash deprives these baskets of their waterproof character and they fall to baser uses they will still serve for many years as fish baskets, or for other purposes. Demijons and carboys, hard receptacles covered with basket work by more civilized people, are only fit for destruction when the inner part is damaged! Figs. 62, 65 and Plate IX give fair representations of the best of these hinai poepoe, and the following list of those in the Museum will explain the illustrations:

No. 3890 (Plate IX) measures, as figured, 21.5 in. high with cover; greatest diameter 9.2 in. The inside wooden (kou) umeke measures 13.2 in. in depth (internal), and 5.7 in. at the mouth. The cover is of the same material and has 6 in. and 6.7 in. internal measurement. The outer basketry comes to within three-quarters of an inch of the top of the umeke, and is finished off by a braid which does not project beyond the general surface; a net of oloná is attached below the fourth round. The cover has a rim like the baskets of the first class, but smaller, and in both the weaving is close and varied only by reversing.

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[17] Freycinet, Voyage autour du monde, 1817-20, II, p. 613.

No. 1405 (Fig. 65) measures 28 in. high and 13.5 in. at the greatest diameter. The interior is a gourd 23 in. deep and 5.2 in. at neck. The strands are three-ply in cover of which the gourd is lost.

No. 3889 (Pl. IX) has a wooden umeke as well shown in Fig. 63; there is no cover; height 12.5 in., while the umeke measures inside 10.5 in., with a diameter of 6.5 in. at neck. The beautiful and close weave at the neck is shown in the figure.

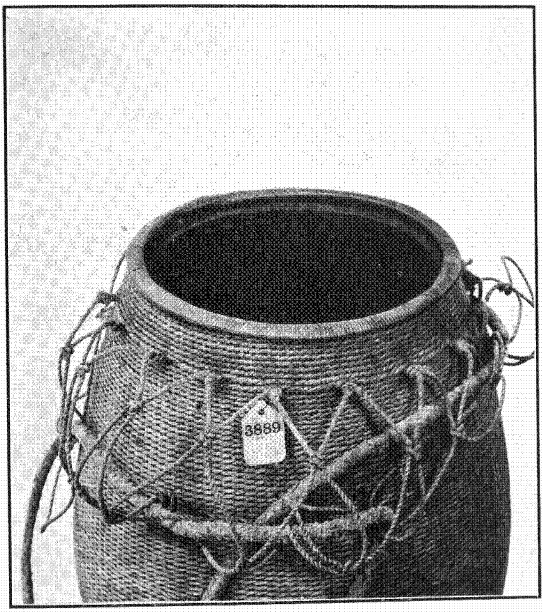


FIG. 63. MOUTH OF HINAI POEPOE NO. 3889.

No. 1403 (Pl. IX) is 25 in. high and 16 in. in diameter: cover empty: both baskets neatly finished at ends by braid.

No. 1406 has no cover; is 14.5 in. high, 13.5 in. in diameter, and contains a gourd; closely woven around the rim.

No. 1550 (Fig. 65) is remarkably long and originally covered a wooden umeke which was broken many years ago, and for more than a score of years the basket has been used as a receptacle for fish. It is 36 in. long,—the longest known. The base shows an unusual beginning for these baskets (Fig. 64). The variations in the bands are shown in Pl. VI and, in part, in Fig. 65.

No. 3890 (Pl. IX) is woven around wooden umeke, in body and cover; height 22 in., diameter 9 in. Best in collection.

No. 1409 (Pl. VIII) is one of the flat calabash baskets, 12 in. high and 18 in. in diameter. As this is the only one of this flat form and has no cover, it is difficult to say what that part consisted of, but it was probably a flat basket work disk, and the basket was used for the preservation of some choice feather cape or lei.

No. 7705 has a diameter of 16 in. and is 27.5 in. high. It is woven on a gourd, but the cover is now empty and the whole is contained in a koko or net used for such purposes.

No. 3844 has lost its internal umeke or gourd. The weaving is much like that in Class I, within which it would be included but for its shape. Height 24 in., diameter 14 in. It has heavy cord loops to secure the cover.

No. 1404 has a height of 16.5 in., and a diameter of 9.5 in.; gourds in basket and in cover; the general finish very good, the weave being in a continuous spiral from beginning to the rim. There are six black bands on the basket and five on the cover; the net for the cover is of oloná (Pl. IX).

In all this class of baskets the work is far above the average of Hawaiian, or indeed Pacific, basket making; the weave is exceedingly close and regular, and the form is peculiar to this group, but most closely resembling certain Hawaiian containers made for holding fish lines, but of wood and gourd without any basketry.

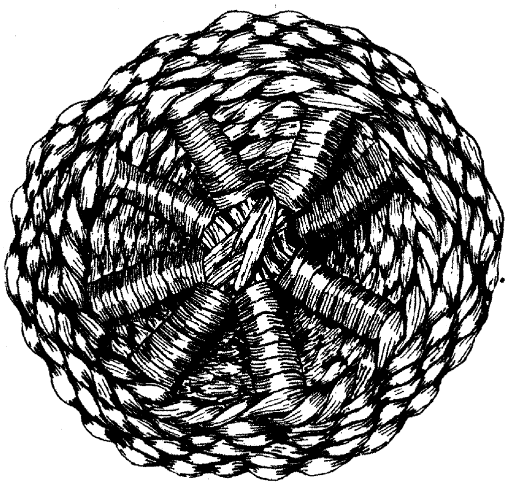


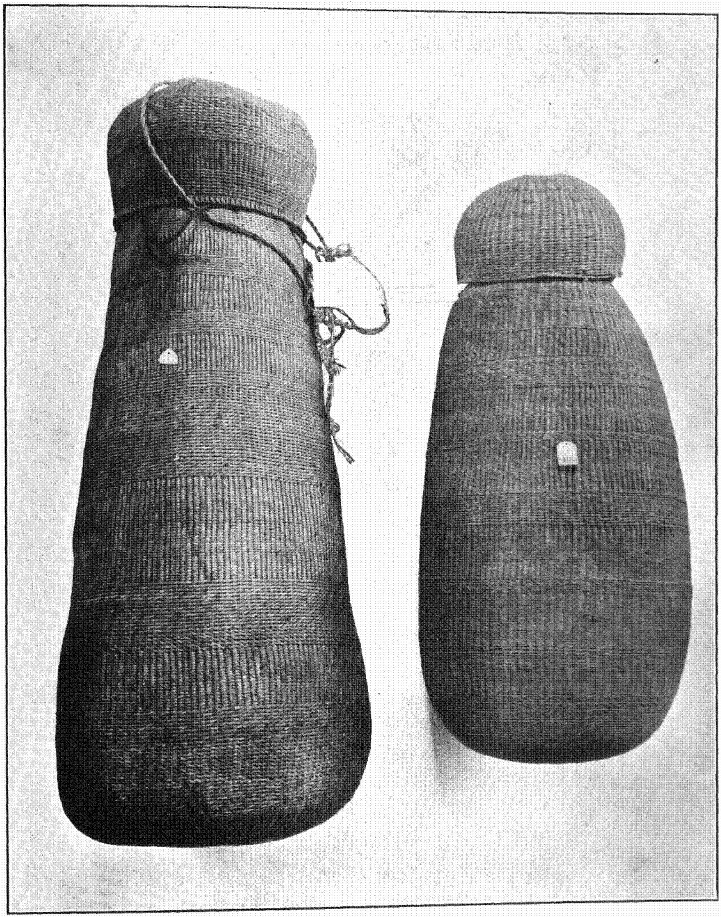
FIG. 64. BOTTOM OF BASKET NO. 1550.

We now come to another class where the workmanship is far inferior, although the general form still reminds us of the fine hinai poepoe. The material, ieie, is the same, but the strips are either used unsplit or carelessly combined. In some an attempt to imitate the older and better work seems present; in others the product is a coarser basket without any enclosed container. The basket becomes suitable for holding fish or any coarse or dirty objects without having to wait until the inner gourd or umeke is broken. The list is not a long one.

No. 1407 is a very modern attempt to imitate the fine work of the old Hawaiians, and, apparently has never been used. Two gourds are employed for foundation, and the basketry is of the coarsest two-ply weave over single rods of the same material; it has much the same appearance as the common demijohn wicker work. Height, with cover, 19 in., diameter 13 in.; net of coco fibre cord. The ieie strips have not been halved; they have only a small portion removed, and the strip is of course less pliable.

No. 4050 is a modern basket finished much as the last, but independent of gourd or umeke, and with a flat top. Height, with cover, 12 in., diameter 10.5 in. Fig. 66.

No. 1408 is of the same general form as the preceding, but is of greater age. It has apparently been woven without any interior vessel, and with Nos. 4050 and 3845 might be put in Class III for convenience of classification. The workmanship is by no means so fine as in Class I, but is better than in No. 4050. Height, without cover, 13 in., diameter 11 in. The rims of both basket and cover are made exactly like that figured in No. 6589, and the latter is secured by a single coco fibre cord ex-



1550 FIG. 65. HAWAIIAN HINAI POEPOE. 1405

tending from its centre to the encircling net of the basket, this net being made partly of oloná, partly of coco fibre. Central specimen in Fig. 66.

No. 3845 is like the last specimen, as may be seen in Fig. 66, but is much smaller, and in place of the usual net to fasten the cover in place, has two loops of cord knotted through the sides, which serve also for handles.

No. 3887 has no cover and was made as an independent basket; the rim is neatly braided and the rounds are three-ply. The rods, added as the diameter increases, are not always spliced to those already in place, but are interpolated like a V, making two rods for each insertion. Height 17 in., diameter 14 in. Has been mended in places with a "darn" of coco fibre cord.

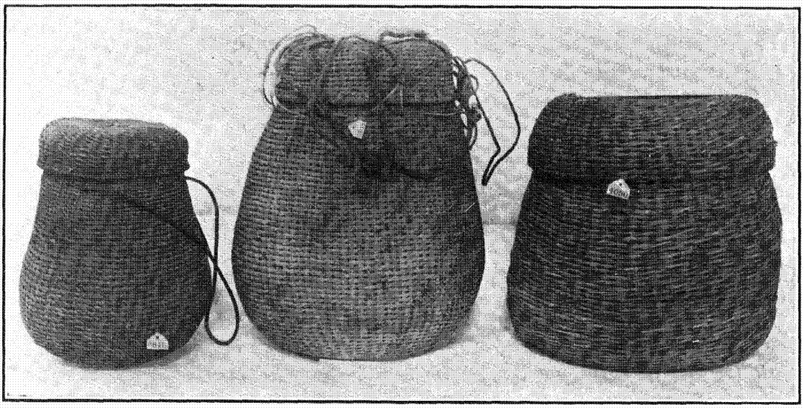


FIG. 66. GROUP OF FLAT-TOPPED HAWAIIAN BASKETS.

No. 3843 is similar to the last, but of coarser workmanship; the rounds are still three-ply, and the rims both of basket and cover are of a number of strips intertwined around the bent ends of the rods, as shown in Fig. 67. Height 17 in., diameter 12 in.

Not only umeke and corresponding gourds were covered with basketry by the old Hawaiians, but also the huewai or gourd water bottles, probably in all cases for additional strength; but with the huewai it also helped to keep the contents cooler. When I first saw the following specimen I was inclined to think the natives in modern times had copied the wicker-covered glass bottles used as perfume bottles or pocket flasks by the foreigners, but I am assured by old Hawaiians that their people made such water bottles in ancient times.

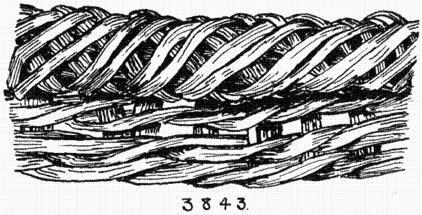


FIG. 67. RIM OF BASKET NO. 3843.

No. 5350 is a huewai or water bottle of gourd covered with a closely-woven three-ply spiral band, alternately brown and black. There are two braided ears on opposite sides of the spring of the neck, to which are still attached the remains of a square braid cord; the cap or capsule is of the same work.

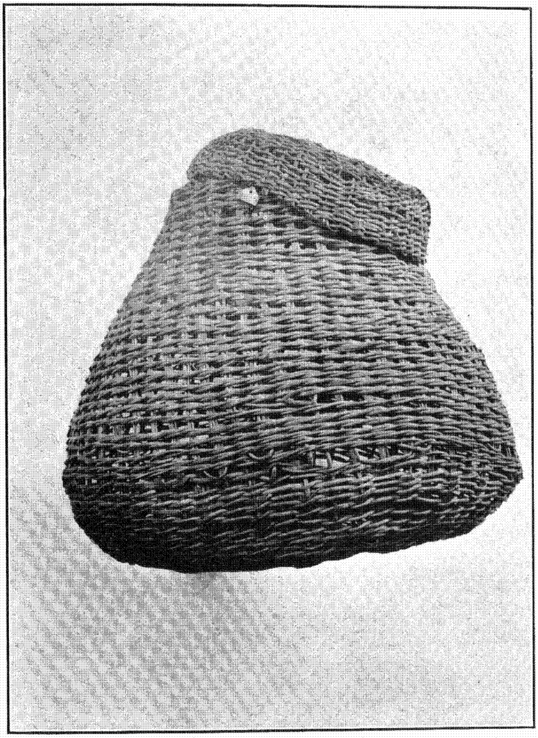


FIG. 68. HAWAIIAN FISH BASKET, NO. 3842.

We come now to an entirely different kind of basket, both in shape and in purpose, although there is, it is true, some likeness in shape to the beautiful baskets of Class I. Its shape and weave is sufficiently shown in the figures to dispense with any particular description. A people depending, as did the Hawaiians, on fish for food would naturally have developed their basketry in that line, and we shall briefly touch upon the common forms, leaving a fuller description of their actual use for the chapter on Hawaiian Fisheries. Many of the baskets that have been described have been used for fish when no longer fit for their original purpose, but the specimen here figured was made for fish and not for anything else.

No. 3842 is a fish basket with a height of 17 in., with cover, and a diameter of 19 in. The weave is three-ply on the basket, and two-ply on the cover, and there are no handles nor fastenings for the cover. See Figs. 68 and 69.

These baskets were common and seem better suited to their purpose than those of woven pandanus leaves already described, and they are both stronger and more durable, but, perhaps on account of their use, they are not often found in collections, as the old ones become very dirty and fishy. Hawaiian fish traps were sometimes made of ieie, sometimes of other vines, but genearlly of iwaiwa or fern stem, and have been described under that division. The curious shrimp baskets deserve notice here, and Plate IV may be consulted for their general appearance and construction. As that plate shows, they vary considerably in size, and in recent times the vendors of curiosities have introduced immense ones to serve for hall decorations or umbrella holders. The scale on the plate is sufficient guide to the size of those figured. Nos. 7681 and 7682 are of a more common size. It should be added that these baskets are used to catch the shrimps, and not to store them.

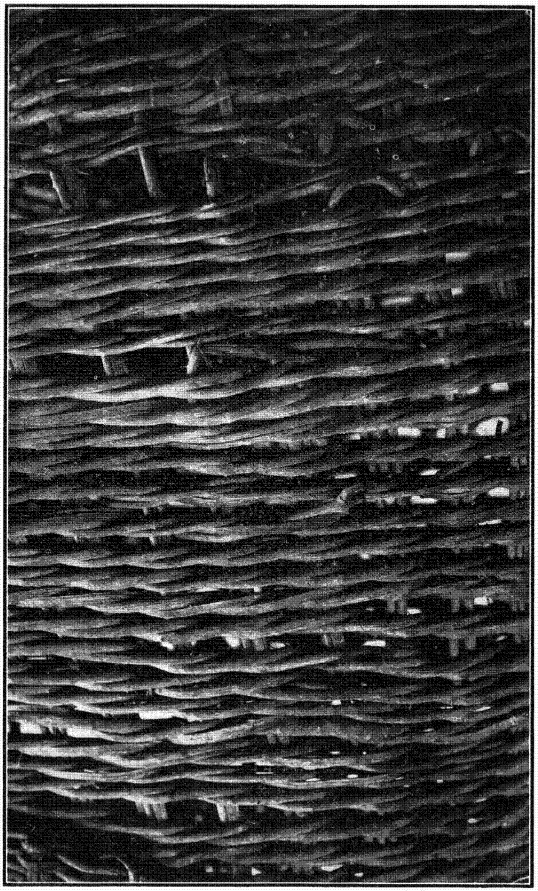


FIG. 69. ENLARGED PORTION OF NO. 3842.

Idols and Helmets.—Another extensive use of ieie strips and rods is found in the manufacture of images of the gods, and helmets. Of the former, huge simulacra were constructed, none of which are now known to exist, although in the early days of the American Mission (1820–1835) sone large specimens remained at Kailua, Hawaii, and it is quite possible others were concealed in caves which may still preserve them. The late King Kalakaua described to me such images he claimed to have seen in a cave in the cliff above Kealakekua Bay. There are still in existence, however, a number of smaller images, notably those of the war god Kukailimoku, some of which have been figured and described in the first volume of these Memoirs. These consisted of a head and neck of ieie basket work, often very neatly made, which was covered with a closely fitting net of oloná fibre, to which were attached the red, yellow and black feathers which distinguished the god.

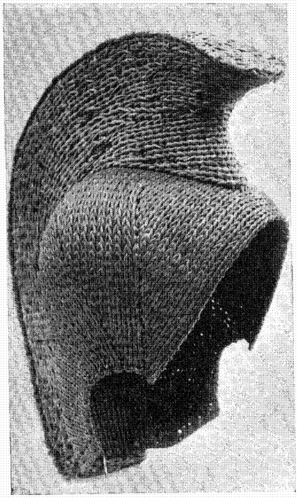


FIG. 70. WICKER WORK HELMET.

The helmets of the ancient chiefs are even more widely distributed through the principal museums of Europe and America. Some of these are made in a comparatively rough manner, as the wicker work was to be covered with feathers, while others were finished specimens of basket work. Illustrations of both classes have been given in the Memoir on Ancient Hawaiian Feather Work,[18] and Figs. 70 and 71 may here repeat examples of them for convenience. The first, Fig. 70, which is in the Australian Museum, Sydney, N. S. W., was once covered with feathers, and is made firmly of a braided structure ingeniously adapted to the irregular shape of the helmet. The other, Fig. 71, was beautifully woven in the manner of the best baskets and was worn without the feathery decoration. Others, apparently intended to remain featherless, are in Berlin, London, Paris and Cambridge, Mass. I have not examined all the substructures of the feather helmets figured (*loc. cit.*), but as all in this Museum are of the same material I infer that it was generally used for these images and helmets.

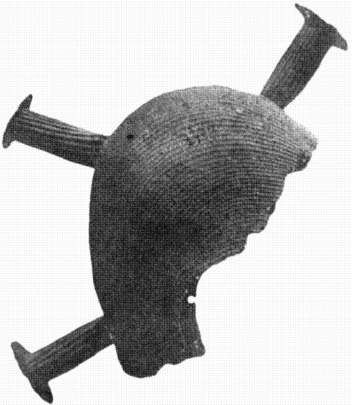


FIG. 71. HELMET OF IEIE.

Fern Stems.—Although among the Hawaiians fern stems were not in common use, they served for small and ornamental baskets, as at the present day. Three ferns bore the general name *iwaiwa*,[19] *Asplenium Adiantum-nigrum*, *Pteris decipiens* and *Adiantum capillus Veneris;* all of these having smooth dark-colored stipes varying in color from dark brown through purple to black. A material not very flexible (except when soaked), but glossy and durable.

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[18] Memoirs B. P. Bishop Museum, Vol. I. No. 1.

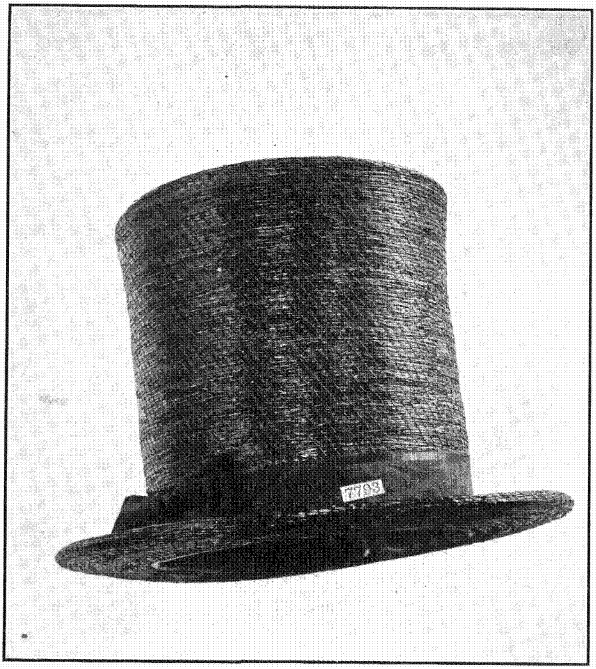

FIG. 72. HAWAIIAN FERN-STEM HAT.

In the days when Honolulu was a rendezvous for whalers in the Pacific a fashion was introduced among the Hawaiians that must have borrowed from methods used long before, so that in describing it the mere curiosity of the result yields wholly to the suggestion of a manufacture of fern-stem basketry, of which no other remains are extant. The hats for women, still made in fancy form, do not suggest any ancient origin. Captains of whalers almost invariably had on board their vessels at least one silk hat, not always of the latest block, which they were accustomed to wear ashore on public or important occasions, and these absurd and uncomfortable head-dresses, which fashion imposed upon the white man, roused great admiration in the breast of his dusky imitator. Wives or sweethearts soon fashioned the respectable imitation (it was in the days of the early missionaries), which is shown in Fig. 72. Fern stems and horse hair are the components, and it was certainly better fitted to withstand tropical rains than its silken prototype. The particular specimen figured, now in the Bishop Museum, was given to the Rev. Rufus Anderson, D.D., Secretary of the American Board of Commissioners for Foreign Missions at the time of his visit to these Islands in 1863. About the same time I saw in the streets of Honolulu a powerfully built native clad only in such a hat and his scanty malo. To the present day the Hawaiians show a respect for this form of hat, although now selecting the imported variety. The specimen illustrated weighs 10.5 ounces.

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[19] Andrews gives the definition "He mea ulu e like me ke palaa, ua ulana pa ia me ka papale mauu."

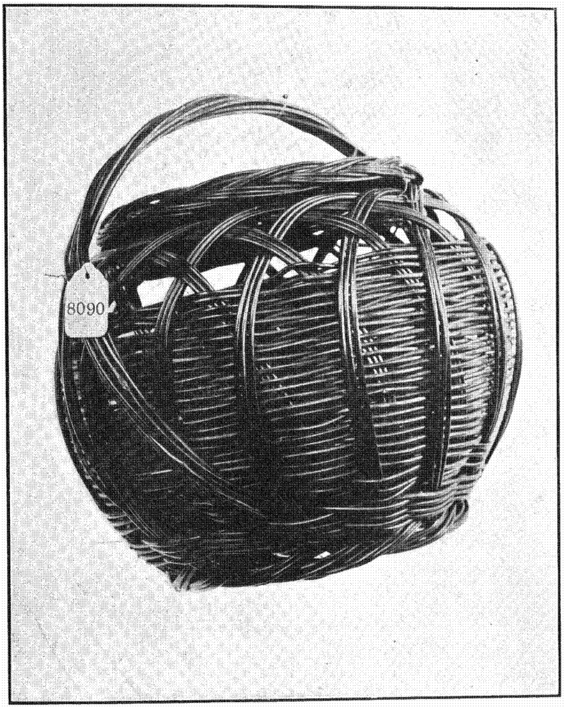

FIG. 73. MODERN JAPANESE FERN-STEM BASKET.

In the Museum collection is No. 8090, shown in Fig. 73, a graceful modern basket made for sale rather than for use. It is Japanese, but was brought by two old natives, known to me for many years as dealers in mats and baskets, with the assurance that it was made by Hawaiians. On their statement the figure was inserted and remains as a warning to collectors of basketry.

On the other groups to the southward more use was made of fern stems, especially for fish traps and baskets, as they are not readily rotted in water. In New Zealand are made fine eel traps (*Hinaki*) and baskets in which to keep fish alive (*Whakarapa*), both shown in Fig. 74. These are made of *mengemenge* fern (*Lygodium articulatum*) a twining fern with stems of great length. The genus is found as far away as New England. The stipe of the *Heruheru* fern (*Todea* (*Leptopteris*) *superba*) is said[20] to be used in the manufacture of combs,

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[20] A. Hamilton, Maori Art, p. 302.

Heru, but the stipita of this splendid fern are very short, seldom exceeding three inches in length, and, however fit for the teeth of combs, not suited for weaving baskets.

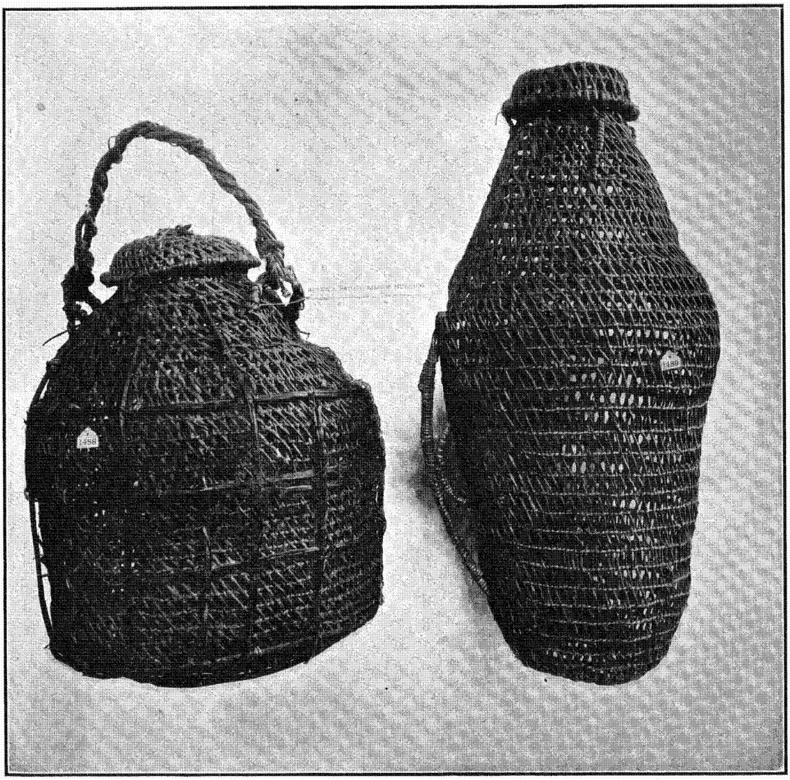

FIG. 74. WHAKARAPA AND HINAKI, NEW ZEALAND FISH BASKETS.

The illustration shows that as specimens of basketry both the Hinaki (compare Hawaiian *Hinai* basket) and Whakarapa are well and strongly made. The handle of the latter is of a form unusual in this region and resembles the bail of a pail. In the Hinaki one long handle extends nearly the length of one side, strengthened in the middle; while two smaller ones are at the lesser end and 90° from the main handle; the cover is hinged and has a loop to fasten it, and the entrance for the eels is at the larger end.

No. 6954 is a very large fish trap made of the same material, measuring 48 in. in length, and 24 in. in diameter. It has three loops on each side near the smaller end. When wet it may be folded flat, although very stiff and firm when dry. The exquisite braid work of the Solomon Islanders has generally been described as of fern, and has even been attributed to a species of *Gleichenia*, but we have in the Museum specimens of a grass from which this attractive work is made, so we must defer farther notice of this to succeeding pages, where the grass manufactures take their turn.

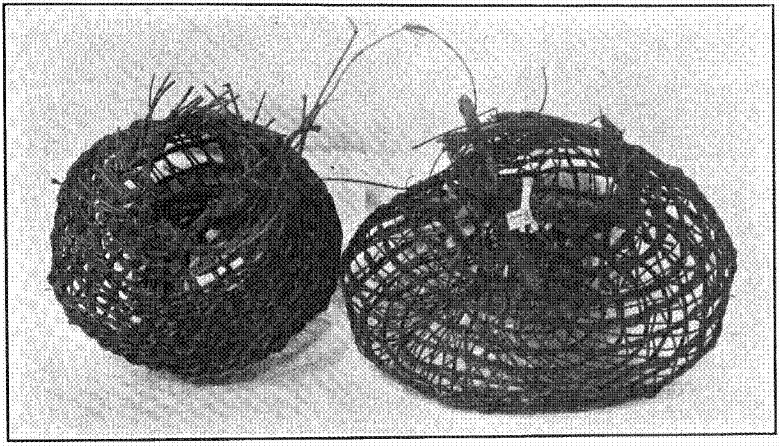

FIG. 75. HAWAIIAN FERN-STEM FISH TRAPS.

So far as is known the old Hawaiians made nothing of fern stems of such great size as the Maori hinaki; indeed they had no fern stems to compare with the *Lygodium* of New Zealand, but they made similar traps of the much shorter Hawaiian ferns. Two of these are shown in the figure, and I am informed that such traps were much used in ancient times; and while sometimes made of other material, as at the present day, the fern was much preferred, and considered more durable. It is quite possible that the dark color of the fern gives some advantage to the fisherman.

Hawaiian Sandals=Na Kamaa Maole.—Necessity must, in very primitive times, have given birth to the invention of sandals in a country where volcanoes often spread lava streams of most extreme roughness across the paths until for miles a surface is formed that not even the hoofs of a horse can stand. Few who have not dissected the foot of a man accustomed to go barefoot can have any idea of the exceeding toughness of such a man's sole; but as little can one who has not walked over it appreciate the sharp roughness of a stream of Hawaiian *aa*, the roughest form of lava. The toughest soled native needs some artificial protection for his feet. In climbing Mauna Loa, the largest of the Hawaiian volcanic mountains, in 1864, the author wore out three sets of rawhide sandals used as protection to stout walking shoes, and only occasional beds of aa were encountered. No one could travel around the island of Hawaii, near the coast, without meeting many miles of this rough road. Where a permanent path was needed smooth beach pebbles were laid for footway, but on occasional journeys one often found no such provision for his feet, and he was forced to weave or braid some mat-like structure for sandals. Any tough fibre at hand was pressed into service; pandanus (*lauhala*), dracæna (*la'i ki*), hau bark (*ili hau*), banana (*lau maia*), poaaha or waoke, all answered sufficiently for the temporary need.

Plate III shows examples of all these. In structure there were two general ways of plaiting the hastily constructed basketry: one, the simplest, consisted of a stout cord of any suitable material formed into a loop for the toes and over and between the parallel sides formed by the cords the leaves were braided or entwined, the tougher stems being left for the under surface, as shown in the first example on Plate III. The loose ends of the looped cord served to bind the sandals to the ankle. The third specimen shown in the same plate is a little more complicated, there being four instead of two cords about which the weft is twined. Fig. 76 shows this more clearly, the loops work in opposite directions and when pulled draw the substance of the sandal together. When waoke or maia was used a very comfortable and serviceable foot support resulted: such are used even now by the white man as well as by the Hawaiian when walking much on the rough coral reefs.

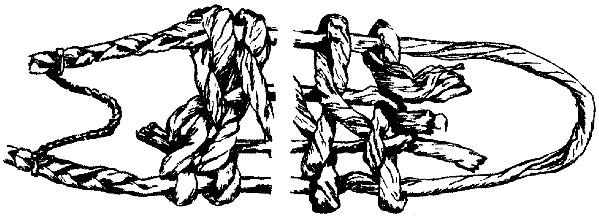

FIG. 76. PLAN OF SANDAL.

Of the sandals in the Bishop Museum at this writing the following list will fairly show the comparative frequency of the material used:

4535. Sandals of lauhala, dry but without special preparation.
4537. Sandals of lauhala.
4538. Sandals of poaaha or partly beaten waoke, rectangular in shape.
4539. Sandals of poaaha, thick and tough.
4540. Sandals of banana leaf stem. These are always rectangular.
4541. Sandals of banana leaf stem with ili hau cords.
4542. Sandals of malina (American aloe).
4543. Sandals of hau bark = ili hau (*Paritium tiliaceum*).

4544. Sandals of lai ki (*Cordyline terminalis*).
4545. Sandals of lai ki for a child.
4546. Sandals of lai ki, stout and coarse.
4547. Sandals of lai ki, well braided.
4548. Sandals of lai ki, from the Queen Emma collection.
4549. Sandals of malina or aloe.
5107. Sandals of poaaha or partly beaten waoke (*Broussonetia papyrifera*).
8986. Sandals of lai ki.
8987. Sandals of lai ki.
8988. Sandals of lai ki.
8989. Sandals of lai ki.
8990. Sandals of hau bark = ili hau.

No other covering for the feet than these sandals were known to the Hawaiians before the advent of foreigners. Although they had the pig I do not know that they ever used pigskin for making sandals, not even after they had seen the pigskin-soled grass slippers of the Chinese, who were early immigrants, Vancouver finding, only fourteen years after the death of Cook, many of these orientals in the country.

Niihau or Makaloa Mats.—In describing the Hawaiian baskets of ieie mention was made of another notable manufacture of these islands, one which is now fast passing to the region of lost arts where the ieie baskets have gone. A few old women still make the mats from the sedge which grows commonly enough along shores and in brackish marshes. It was chiefly on the little island of Niihau that the makaloa mats were made, although the sedge (*Cyperus lævigatus*) grows on Oahu and other islands of the group, and it is claimed that those with colored figures (*Na moena pawehe*) were not made elsewhere. Exact information is hard to obtain on such matters, but certainly Niihau, populous enough in olden time, was the chief factory and gave name to the fabric. This was doubtless the mat noticed with admiration by early voyagers, of which mention has been already made.

The preparation of the sedge was simple, but only while the plant was young could the finest mats be woven, so that the time of working on these was limited to a few months each year, and the people had not learned the method of procuring a succession of crops. The weaving of the mat was begun, as shown clearly in Plate X, and the leaves added as needed. In comparing this figure with that of the pandanus mat, Fig. 54, the great difference in the length of the staple will be noted. As with the hala, the leaves dried over a fire were whiter, and in the case of the makaloa these were called *olala;* it was the favorite kind of leaf used, except perhaps for the large floor coverings. The red figures are formed from the lower portion of the stem, which is naturally colored; but while this color is fairly durable, it turns a dirty brown on long exposure to the light. The fresh color, both of the olala and the red figures, is well shown on Plate XVI. These figures are an embroidery and do not show on the reverse. The patterns used are very simple geometric ones that do not present the variety shown in the decorated Hawaiian kapa, but the nature of the texture kept these within narrow bounds. Even on kapa, where the surface admits of any form, we seldom find the attempt to represent natural objects; almost always it was ornamentation composed of triangles, rhombs, squares and lines. All these patterns had names, and I have been at some pains to preserve these which will be found in the illustrations (Figs. 77-81, and Pls. XI–XIII, and XVI). Not only did the weaver use these external decorations, but in the very weave she used her fancy in a way seldom found in the hala mats, and some mats are a series of stripes, each of a different weave. These fancy stripes sometimes alternate with those of a plain weave, and on these latter were generally embroidered the red figures. One mat in this collection, No. 10,072, recently made, shows not only nearly all the usual figures but is woven in nearly all the known styles, including fancy twills. The names of the patterns are as follows:

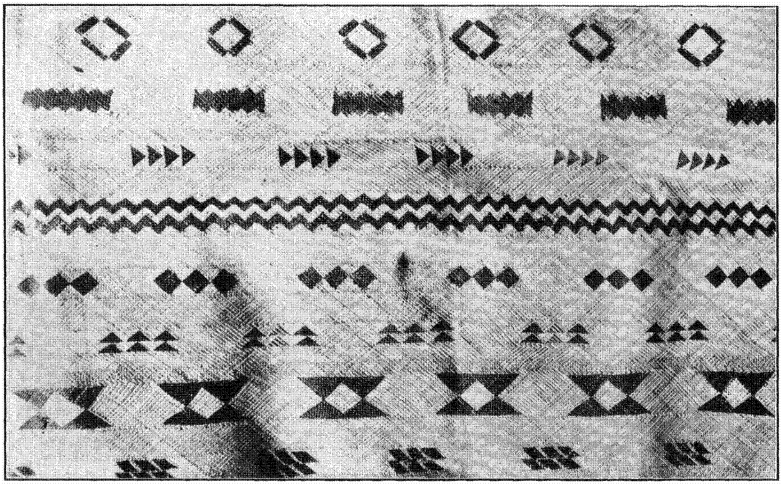
FIG. 77. NIIHAU MAKALOA MAT.

Keekee. Bent, zigzag; a favorite form, reminding one of the Egyptian hieroglyph for water. Fig. 78.

Olowahia. A saw; this is also a favorite design. Fig. 79.

Kuhanu. Breath of Ku (the god of war). Fig. 79. (Second and fourth band.)

Humuuniki. Squares joined. Fig. 80. (Central band.)

Papaula. Red row. Fig. 80. (Second band from bottom.)

Puakala. Rough, like the leaf of the *Argemone*. Fig. 80. (Bottom band.)

Hale = house. Fig. 81.

Nene = geese flying. Fig. 81.

Papa konane = checkers.

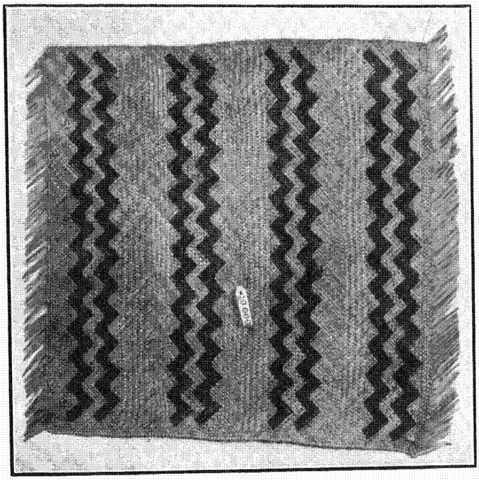

FIG. 78. KEEKEE PATTERN.

In some of the oldest mats the keekee and olowahia alone appear; in others the weaver seems to have exhausted her list of designs, as shown in Fig. 77 and Pls. XII, XIII. A combination of triangles was constantly used, either a large triangle made up of a series of smaller ones (Fig. 83B), or a row where the apex of one touched the centre of the base of the succeeding (Fig. 83G), or two triangles were arranged with the apex of each in juxtaposition (Figs. 80, 83D): the last was greatly used as a central dotting. The combination of triangles and squares, of which the distinctive name is not known (that is, they are not found in my note book of forty years ago) may be seen in Fig. 83, where the numbers there given are used in the descriptive list of the mats given below. After the islanders had learned to read, under the instruction of the American missionaries, the use of letters of the alphabet became common both in tatuing and mat decorating, and mats somewhat resembling the samplers of our grandmothers' days were woven. It soon became common to write affectionate greeting on mats intended as presents to friends, and I have seen a number of these. On sleeping mats I have seen embroidered the inscription "*Kuu ipo, kuu lei, kuu milimili e*" (My darling, my crown, my thing to be gazed upon). It is often difficult to decipher these mat inscriptions, as the technic prevents the use of curves, and the individual letters were of strange forms, and, like the ancient Greek inscriptions, there was not that separation between the words that a modern reader demands.

The largest mat in this Museum is No. 2574—30.5 ft. long and 14.5 ft. wide, but it is not of the finest weave (11 to inch); combinations of four squares and of eight triangles alternate over the surface. The smallest makaloa mat is No. 2601, a malo or waist band worn by a chief; it is about 9 in. wide and 6 ft. long, and of a fineness of 20 to inch. Another very ancient makaloa malo, No. 2600, from Queen Emma's collection, is said to be the identical malo worn by the Moi Liloa when he met Akahikameainoa, and which afterward became the token of the paternity of his son, the famous Umi.[21] It is a complete ruin, only being kept together in part by cementing to cloth, but the weave is very fine (31-34 grasses to the inch). The finest mat in this Museum is of great size (20×10.5 ft.), and has 17 grasses to the inch; it is as flexible as cloth, although more than a century old, and it was worn as a cloak or toga by Kamehameha the Conqueror, from whom it came to his descendant, Mrs. Bishop. Unfortunately it has been badly damaged by worms, a reminder that these mats quickly perish in this way if not carefully guarded, and perhaps the finest known collection of these mats was lately destroyed here by the negligence of the owner.

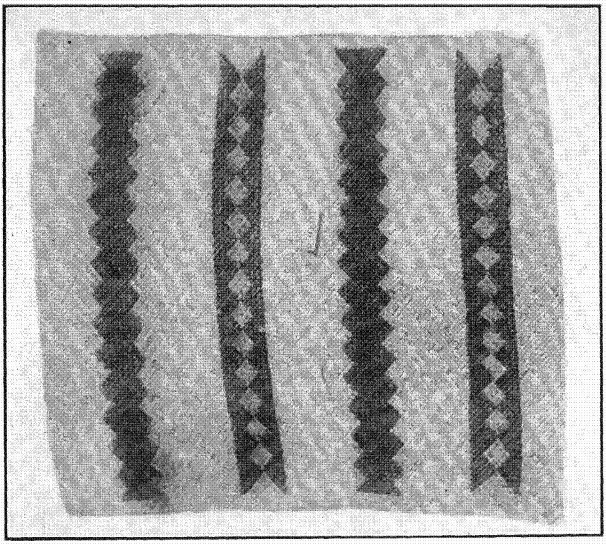

FIG. 79. OLOWAHIA AND KAHANU PATTERNS.

By comparing this with the fine pandanus mat from Samoa it will be seen that the choice production of the southern island is finer, but it is woven from narrow portions of leaf, while the makaloa of the Hawaiian is from the entire stem. It seems worth while to place in tabular form the principal mats in the Museum collection, that the great range of size, if nothing else, may be seen at a glance, and this collection is large enough to furnish specimens of all known varieties of this nearly obsolete mat. First I place the plain or unfigured mats (*pakea*) whether of uniform weave or varied with twills or other fancy weaving.

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[21] J. Remy: Contributions of a Venerable Savage to the Ancient History of the Hawaiian Islands, Boston 1868, p. 18.

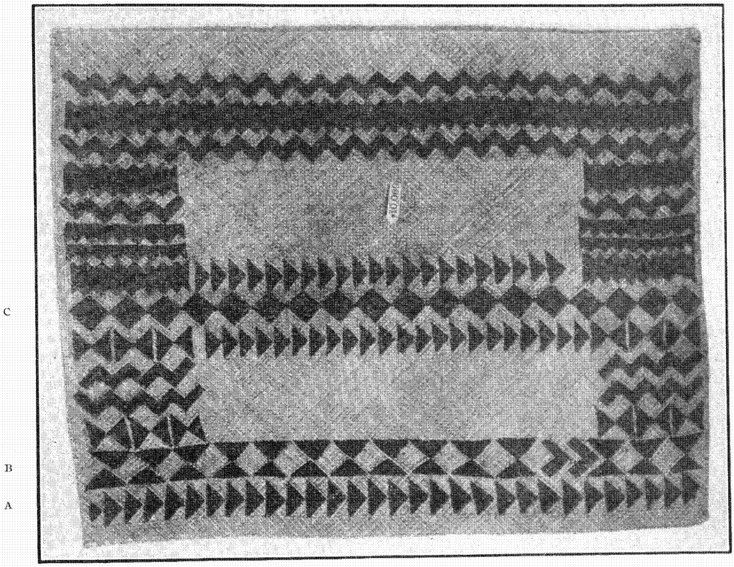

FIG. 80. PUAKALA (A), PAPAULA (B), HUMUNIKI (C).

PLAIN MAKALOA MATS IN THE BISHOP MUSEUM.

2550.	14.3 ft.×9.5 ft.	Carpet for floor or large hikiee.
2551.	10 ft.×7 ft.	
2552.	10 ft.×7.5 ft.	
2553.	12.2 ft.×6.5 ft.	Very old.
2587.	9.7 ft.×6.5 ft.	
2588.	20 ft.×10.5 ft.—17 to inch.	Belonged to Kamehameha I about 1780(?).
2589.	7 ft.×4.5 ft.	
2590.	6.5 ft.×5 ft.	From Queen Emma's collection.

7650. 8.2 ft.×7 ft.—9-11 to inch. Finely woven in many patterns.
7718. 11.5 ft.×9.5 ft.
2601. 5.9 ft.×0.5 ft.—20 to inch. Chief's malo or waist covering.

Moena Makaloa Pawehe in the Bishop Museum.

2554. 18.5 ft.×9.5 ft. Serrated longitudinal stripes. Leleiohoku collection. Fig. 83L.
2555. 7.5 ft.×7.2 ft. Keekee, olowahia and other stripes.
2556. 9.5 ft.×7.5 ft.

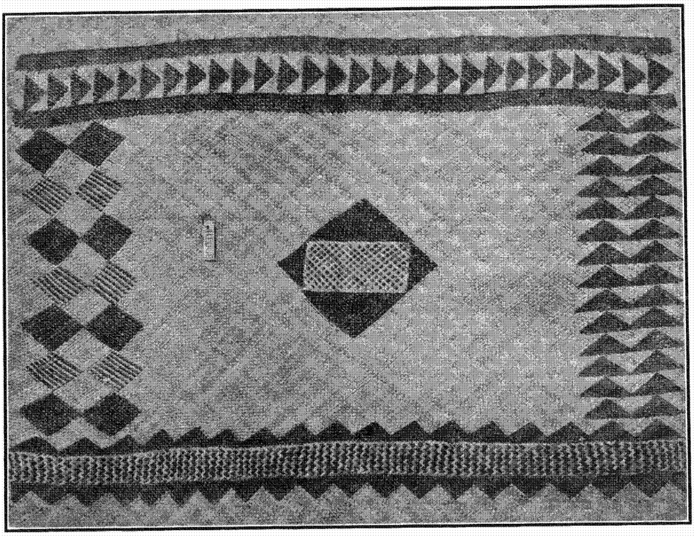

FIG. 81. MAT PATTERNS.

2557. 24 ft.×13 ft.—10 to inch. Broad and narrow long stripes. Given by Kekauonohi to Queen Emma's mother.
2558. 15 ft.×10.5 ft. Triangles variously arranged; border around all.
2559. 10.6 ft.×10.6 ft. Triangles in pairs all over. Fig. 83G.
2560. 7.7 ft.×6.5 ft. Compound triangles, rhombs and squares. Fig. 83B.
2561. 26 ft.×15.5 ft.
2562. 7.9 ft.×6.7 ft. Broad, compound bands.
2563. 13.5 ft.×11 ft. Papa konane all over. Fig. 83F.
2564. 9 ft.×6 ft. Weave plain and fancy; former triangles, olowahia, papaula, squares.
2565. 9.2 ft.×7.5 ft. Border of squares touching by angles. Fig. 83F.
2566. 27.6 ft.×13.5 ft. Triangles, rhombs and squares.

2567. 15.5 in.×7.7 ft. Keekee and four triangles apposed in pairs by points.
2568. 9.5 ft.×6.2 ft. Keekee, nene, plain double stripes and Fig. 83H.
2569. 9.2 ft.×6.7 ft. Broad stripes interrupted by rhombs and zigzags.
2570. 7 ft.×6 ft. Lettered all over, but the rude letters almost faded out.
2571. 7 ft.×6 ft. Stripes and keekee.

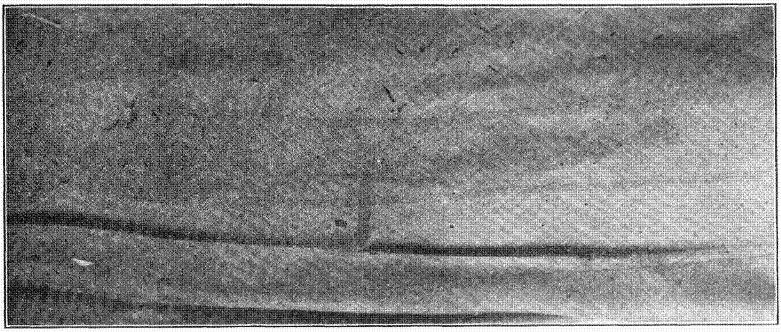

FIG. 82. MAT BELONGING TO KAMEHAMEHA I.

2772. 9 ft.×5.5 ft.
2573. 10 ft.×6 ft.
2574. 30.5 ft.×14.5 ft.—11 to inch.
2575. 11 ft.×9 ft.

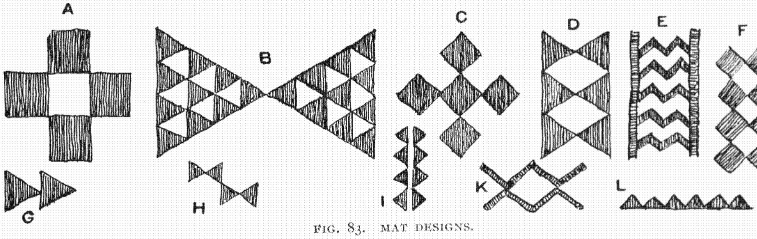

FIG. 83. MAT DESIGNS.

2576. 11.9 ft.×7.5 ft.—10 to inch. Keekee and olowahia in short stripes.
2577. 10.5 ft.×7.5 ft.—11 to inch.
2578. 8.5 ft.×6.5 ft.
2579. 11 ft.×7.5 ft.
2593. 10 ft.×7 ft.
6878. 9.3 ft.×6.7 ft. Keekee and olowahia stripes.
10,072. 9.2 ft.×6.7 ft.
6633. 8.5 ft.×6.5 ft.—12 to inch. Triangles, squares, etc.
6634. 9.2 ft.×6 ft.—9 to inch. Stripes and raised bands.

Coarser mats were made from akaakai (*Scirpus lacustris*) of which abundance is found in the marshes around Honolulu. These were used as mats for temporary purposes, or sometimes for the lower layers of the hikiee bed, but they were not durable and the surface was soon destroyed. The following are examples from the Museum collection.

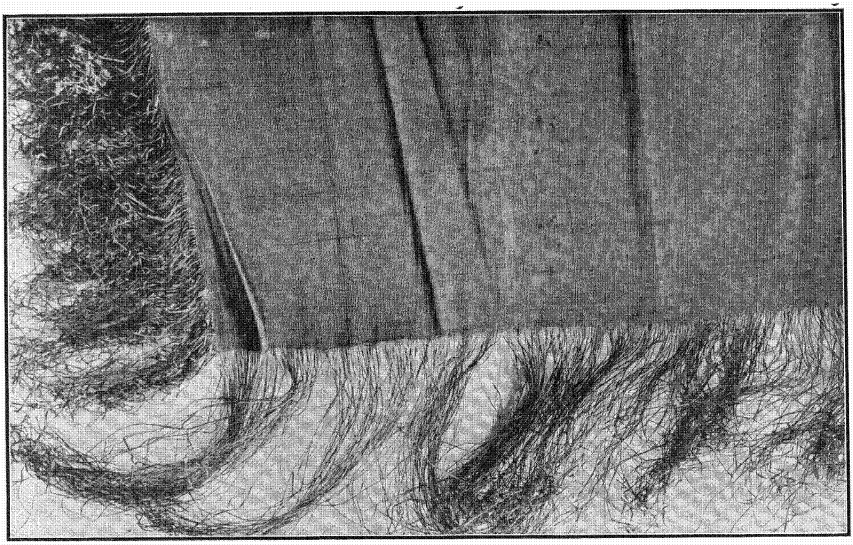

FIG. 84. GRASS MAT.

MOENA AKAAKAI IN THE BISHOP MUSEUM.

2584. 5 ft.×2.5 ft.
2585. 6 ft.×6 ft.
2594. 10 ft.×8 ft.
2595. 8.7 ft.×7 ft.
2596. 20 ft.×10 ft.
2597. 9.5 ft.×7 ft.
6635. 11.6 ft.×9.3 ft.—7 to inch. Heavy floor mat.

Grass Baskets are not much in evidence as an Hawaiian product, but in the Bishop Museum is a very pretty basket from Maloelab (Calvert's Id.) in the Marshall group, No. 3347 in Pl. I. This is said to have been produced in 1849 and has been somewhat of a puzzle as to its constituents. It is small, height 4.7 in., diameter 3.2 in., and the bottom is a close ordinary weave of a dark brown grass which also is gathered into vertical rods and horizontal coils, these two elements forming a trellis not interwoven but the vertical rods are all outside and the horizontal rings all inside; over this trellis runs a sewing strip in four colors, straw, chocolate, white and yellow. These various colored strips seem to be split straw, but I have not definite knowledge of them or of the dyes used. The ornamental bands are shown in the plate, the dark is always chocolate; the interior of the upper band is half straw and half white, of the lower band, yellow. The vertical rods are closed in at the rim by a braid which conceals the ends. The interior is rough where the ends show: there is no handle nor cover.

Solomon Islands Grass Work.—Although authors have stated that the beautiful braids of black, red and yellow material that the Solomon Islanders are so fond of using to adorn their choice spears, clubs and, in curious company, their combs, was from the stem of a species of fern (*Gleichenia*),[22] it now seems settled that it is a grass, species unknown, that is used. We have in the Bishop Museum a parcel (No. 8287) of the dyed grass used in this work brought from Bougainville by our collector. The native name is *latile*, and it seems to have a semi-sacred nature for it is used to form amulets, and perhaps hence its appropriate use in choice spears and clubs. It is said to be dyed with lime and the root of a certain tree (*Morinda?*). The dyed grass averages 27 inches long, and the leaves on stem split readily showing a considerable rough fibre beneath the smooth surface.

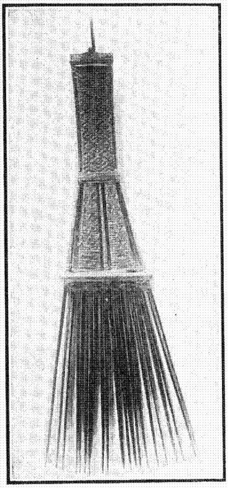

FIG. 85. COMB OF PALM WOOD AND GRASS BRAID.

Although the clubs and spears show a great deal of fine work, I am inclined to give the palm to a comb in this Museum, No. 1941, shown in Fig. 85. This is made of the usual palm splints (not whalebone as mentioned by some authors), and of a form well known in collections. This particular specimen was collected on Bougainville fifty years ago and is 7.5 in. long. The design is alike on both sides, but in the narrow portion of the handle the colors yellow and black are reversed on the side not figured. The two bars of the lower portion are red embroidered with yellow. The braid at the base and around the upper and middle portion is brown. The illustration unfortunately can give no adequate idea of the color and the beautifully exact and appropriate design. Another specimen (No. 6329) is smaller (6 in.), and although made on a plan similar to the preceding shows signs of deterioration in the workmanship: it was collected in 1903.

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[22] Ling Roth, Spears and other articles from the Solomon Ids. Archives Intern. d'Ethnologie, xi, 154.

One of the fine spears in the Solomons collection has twenty-four bands of woven red and yellow covering, separated by plain circumferential bands and exhibiting perhaps six or seven different designs. An implement called a "chief's wand or sceptre" has ten of such woven bands. The weaving on the clubs of lenticular section is very exact and tense or it would soon get loose on the tapering body, unless, as sometimes seems to be the case, it is cemented on. Spears with carved head inlaid with pearl shell often have a narrow band of this finely woven covering.

Bambu Work.—We may now return to Hawaiian matters. Modern fans are often made of split bambu which affords thin laminæ separating much as does the paper birch bark of our northern regions. These strips, of varying width and length according to the use intended, are very beautiful and the fans made from them (which are perhaps much less beautiful than the bambu strips of which they are constructed) are shown in Plate XV, where Nos. 19, 22-24, in the lower part of the plate, are of this material. The brilliant white is often contrasted with the outer skin of the black banana. A golden brown fern stem is also used in these fans for color effects. The banana is shown in No. 19, and the fern in No. 7.

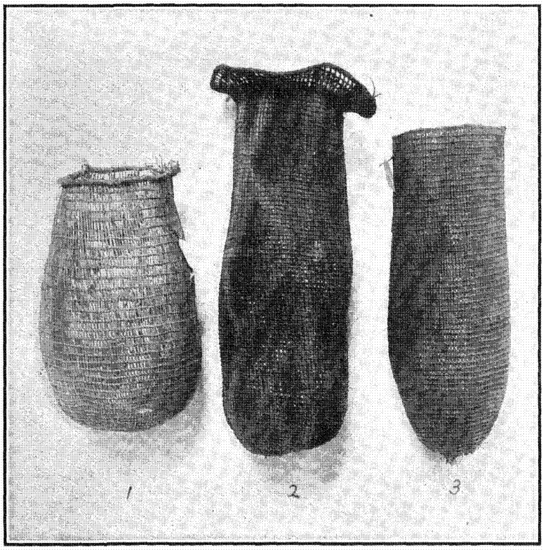

FIG. 86. BASKETS FROM NORTHERN AUSTRALIA.

Sugar Cane.—An uncommon but very beautiful material for braids used in hat making is found in the sugar cane. This grass was found on these islands by the early voyagers, but so far as I am aware its use in basketry is modern. The strips are very glossy and become, by age or exposure to the sun, a golden brown. Cane leaves have long been used for thatching the native houses, but are less easily worked and much less durable than the common pili grass.

Australian Baskets.—All through this account of Hawaiian basket and mat weaving illustrations have been drawn from other Polynesian sources, nor has that been the limit, for Micronesian and Papuan sources have also been freely taxed in order that perchance the geographical origin of certain forms or methods might be indicated: and for this it seems as important to show the work of tribes within the Pacific area, even when that work appears widely divergent from that forming the basis of this treatise. If we had a fairly complete collection of Pacific basketry, such as this Museum is striving to gather, much might be gleaned of the traces of ancient intercourse, if not of common origin, of the tribes whose descendants are now verging toward extinction on the islands of the Pacific. This would be truer of baskets than of mats, for the latter have always been deemed of greater value as property, and have always been favorite objects of barter or of plunder. Reference has already been made to the care bestowed by the old Samoans on their choice mats and the great length of time during which they have been preserved. The baskets seem to have been made under a less favoring star, and however useful, however ornamental they may have been, they certainly have not stood so high in the estimation of their makers or owners as have the mats. Perhaps enough of the human has clung to them from the busy fingers of their makers to impart to the senseless intertwined and knotted strips the usual human lot, where the quietly *useful* people are, when dead, soon forgotten, while the brazen warriors or the astute politicians are preserved in marble or bronze or *aere perennius* in the pages of history.

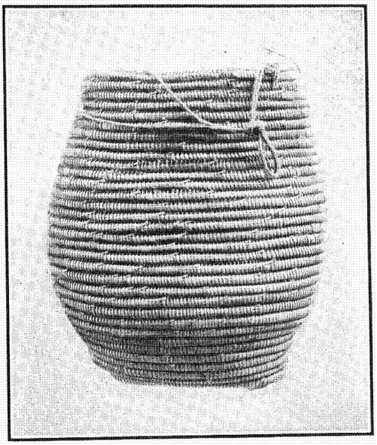

FIG. 87. COILED BASKET IN THE AUSTRALIAN MUSEUM.

The coiled form of basket, so common among the Amerinds, is also found sporadically in the Pacific regions, as at Fiji, New Britain, New Guinea, and here in Australia. All the Australian coiled baskets that have come to my notice are knotted coiled, that is, the thread that unites the adjoining circles of the coil are knotted between the coils, as shown plainly in Fig. 87, or perhaps better in the specimen in this Museum given in Fig. 88. In all the foundation of the coil is some small fibre or grass, to which I am unable to give a name, and the connecting thread has much the appearance of rattan, and is perhaps from some vine allied to the *Calamus*. The best description of these and other Australian baskets is found in R. Brough Smith's Aborigines of Victoria,[23] and in the account of certain decorated baskets by R. Etheridge in the Archives internationales d'Ethnographie.[24]

In the specimen in this Museum (Fig. 88) the shape varies a little from that shown in Fig. 87, which is more like that figured by Smith. Here the diameter is 10 in., height 6 in., with a handle of Eucalyptus fibre (*Eucalyptus obliqua*) network. The native name in Gippsland is *Minni-gnal-ok*. This old form is now scarce, as the native women make them with many modifications to sell to whites. This basket is strong and elastic but not finely made. A peculiar form of coiled basket is shown in Fig. 89. This was formerly common among natives of South Australia but now rarely seen. Eyre says that in one part of South Australia this basket is called *Pool-la-da-noo-Ko*.[25] Two are in this Museum; the one figured, No. 1916, is 8 in. in diameter, and is decorated by spiral stitching; the other is of the same diameter but has a neck of three coils, and is also decorated by red stitching. In both the handle is formed by a continuation of the coil. As to the material, Smith says that both *Poa australis* and *Xerotes longifolia* were used for basket making. In Fig. 89 is also shown a common form of basket of which two are in this

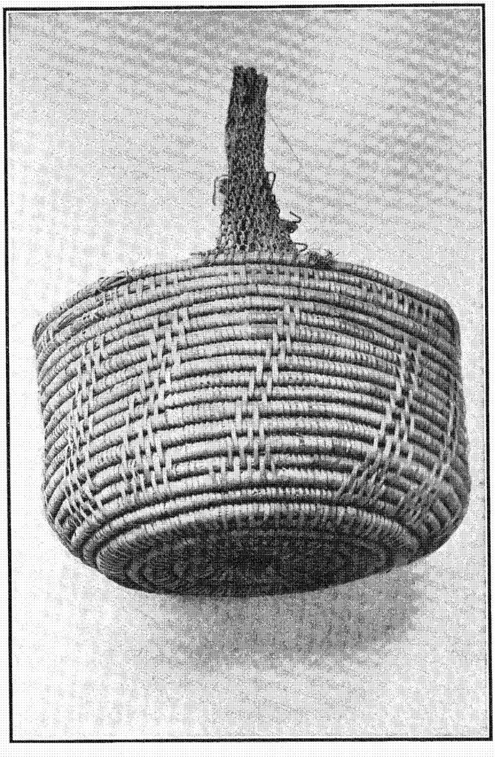

FIG. 88. COILED BASKET FROM GIPPSLAND.

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[23] R. Brough Smith, The Aborigines of Victoria. Melbourne, 1878, vol. i, p. 345.

[24] Archives internationales d'Ethnographie, xii, p. 1. On the Ornamentation of some North Australian "Dilly Baskets." A study in Australian Aboriginal Decorative Art, by R. Etheridge, Junr., Curator Australian Museum, Sydney. Mr. Etheridge has also described the manufacture of baskets in the Macleay Memorial, vol. Linn. So. N. S. Wales, 1893, pp. 247 and 249.

[25] Aborigines of Victoria, p. 345.

Museum. In the one figured, No. 7430, from Queensland, the weave is quite open, and the basket at the mouth measures 8.5 in., is 12 in. high, and 14 in. between the points. The handle, attached to one side only, is of white strip long enough to go over the shoulder. The other specimen is larger, measuring 10 in. at the mouth, 14 in. high, 16 in. from point to point. In both the handle is securely fastened to three of the regular ribs and to an additional rib inserted for strengthening this attachment and extending only half around the basket.

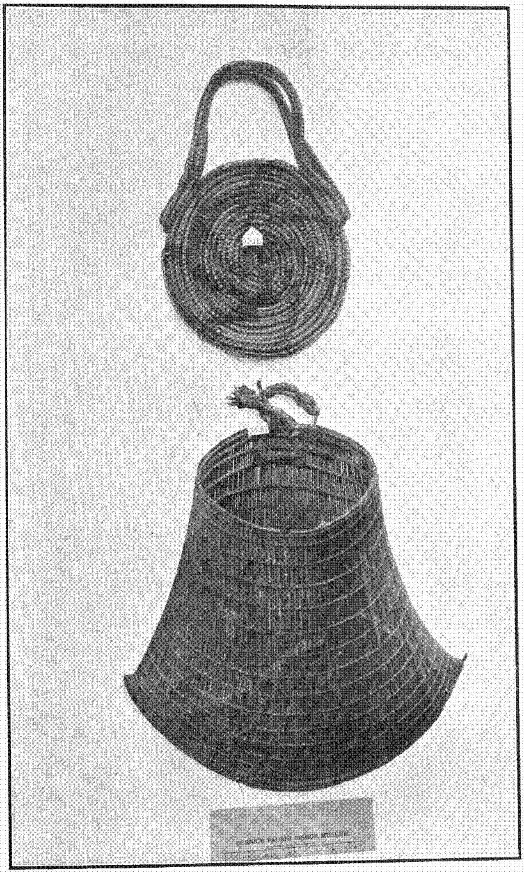

FIG. 89. AUSTRALIAN BASKETS.

The choicest of all the Australian baskets are those known as "Dilly Baskets" and used to carry the small tools and treasures of the owner. Three are figured in Fig. 86 and another in Fig. 90. Seldom of large size, they sometimes are very small; in one figured by Etheridge (*loc. cit.*, p. 5) the length is only 6.7 in., and the mouth only 1 in. in diameter. This little basket was decorated by first coating the entire surface with Indian red pigment and then with lighter red, white and yellow, the ornamentation was completed. The Australian Museum possesses this gem of Australian, basketry. Of the three dilly baskets shown in Fig. 86, the first, No. 8741, is 9.5 in. long, and 5.5 in. in diameter. The structure is loose but strong, of a grass-like fibre and this particular variety is often much larger, as shown in a specimen in this Museum, No. 8740, unfinished, which measures 18 in. long by 14 in. in diameter. The second specimen, No. 8750, measures 13 in. in length by 5 in. at the neck, and 7 in. through the collar. It is decorated with white lines on a dark red ground. No. 8756, the third in the figure, measures 12 in. long, with a diameter of 5 in.; the original decoration of red zigzags is nearly obliterated. These three dilly baskets were collected by Mr. Harry Stockdale, of Sydney, in the Alligator River District near Port Darwin, and are now in this Museum. From the same district, also from Mr. Stockdale's collection, No. 8755 comes to this Museum, and it is a choice specimen of the most elaborate decoration of the Australian basket makers. Unfortunately the method of coloring does not prove lasting, and the pigment rubs off much in the manner of ordinary whitewash; still in this specimen, as may be seen in the illustration, Fig. 90, enough remains to show that the skill of the decorator was above the ordinary. The decoration does not extend quite around the basket and is divided into five zones, the upper one composed of one horizontal and a number of vertical white lines; below this seven vertical lines, rather shorter than the last, flanked by two rosettes and what seems to be a hunting scene. Then comes a corroboree in which the male figures are quite distinct; then a band of confused figures,

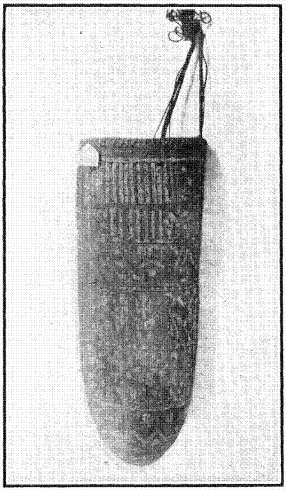

FIG. 90. DECORATED DILLY BASKET.

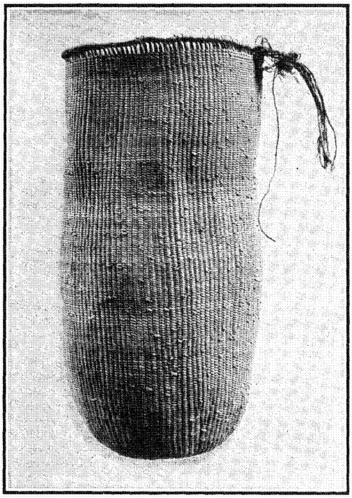

FIG. 91. PLAIN DILLY BASKET, AUSTRALIAN MUSEUM.

and the curved base of the basket has a row of white squares, then a zigzag line below which are other triangles and dots. The basket is closely woven and of good form. It does not seem to have been figured by Mr. Etheridge, whose familiarity with all forms of Australian decoration might have explained more clearly the designs. A more complete description of this important basket is as follows:

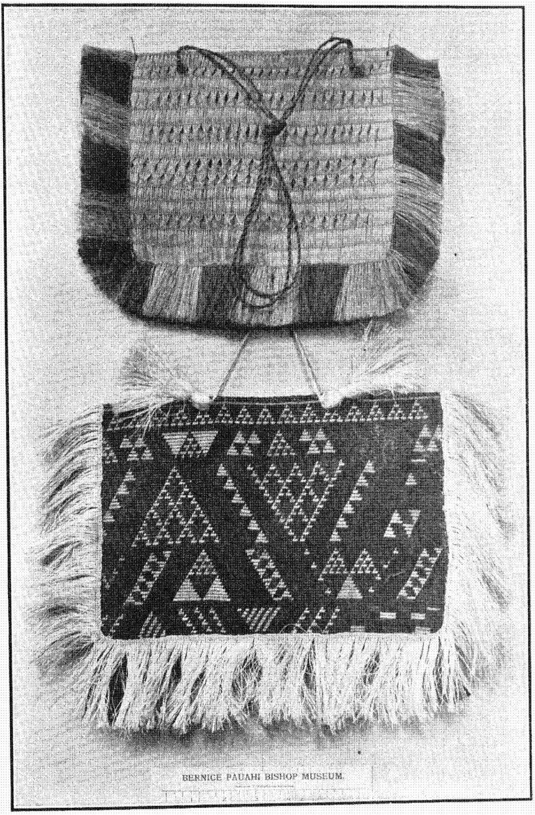

FIG. 92. KETE OF HARAKAKE FIBRE.

No. 8755. Length 14 in., diameter 5 in., rounded bottom. Upper rim sewed with stout twisted cord: surface divided into seven zones by double raised bands; painted dull red, on which ground are black and white designs which extend over more than one-third of the circumference, and there are indications of other marks on the side worn next the body now undecipherable. Upper zone narrow and plain; second has 14 vertical white stripes and rosettes at each end of the series; third has 7 similar stripes, but shorter, and with rosettes at each end; fourth has what seem to be hieroglyphics(?); fifth has a corroboree with 5 male figures; sixth has confused marks, unintelligible; seventh has 7 rectangles forming a zigzag with a figure in the midst resembling a three-barred gate, triangular spots within lower angles of band which extends two-thirds of the circumference; 5 square spots above the band and the same number below, this zone ending in 5 concentric rings. Inside of basket unpainted; carried by five cords attached in two places on one side of the rim.

A plain dilly basket in the Australian Museum is shown in Fig. 91 by the kindness of Mr. Etheridge. It has a rather flatter base than the others, and the rim is slightly detached from the filling.

New Zealand Kete.—The so-called "flax" of New Zealand (*Phormium tenax* Forst., native *Harakake*) is one of the most important commercial fibres of the Pacific region. This liliaceous plant, of which the observant old Maori distinguished fifty or sixty varieties, and the botanists note two species, grows wild over a vast extent of marshy land in New Zealand, and the traveler through the North Island sees the plant with its tall flower stems on every side. Indeed on landing at Auckland one sees bale upon bale of the attractive looking fibre awaiting shipment. It is unnecessary here to go into the commercial preparation of the fibre for several full accounts of this are accessible,[26] and we need only present some of the products made from this raw material in the line of our present study.

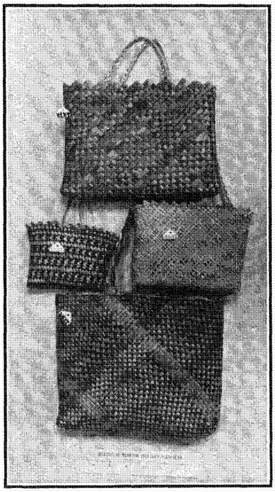

FIG. 93. MAORI SATCHELS.

Kapa or bark cloth made of felted fibre was useless in the cool and wet climate of New Zealand, and the Polynesian immigrants must soon have devised a way to utilize a fibre as beautiful as it is tenacious and durable. It is often stated in books on New Zealand that no implement or machine can clean the fibre with the perfection of that very primitive tool a Maori thumbnail, and while this is true in a sense it must be acknowledged that modern machinery certainly turns out a very fine product.

It would be very interesting to go more fully into an examination of the weaving of the wonderful cloaks, of which extraordinary examples are in this and other museums, but this has been well done by Mr. Hamilton, now Director of the Wellington Museum (*loc. cit.*, p. 271), and his illustrations show the perfection to which the native manufacture attained. There was no loom, but the pegs (*turuturu-parawai*) which held the web for the webster during weaving were often grotesquely carved. I have, however, thought best to give some examples of the *kete*, kits or satchels, in this weaving as they illustrate the work as well perhaps as the more elaborate cloaks. Fig. 92 shows two of these, the upper one, No. 5819, is of bleached fibre mingled with a portion dyed yellow (with a *Coprosma?*). The weave is very simple and effective, as can readily be seen in the illustration. In some remarkably fine and costly ones that I found in the Taranaki district the weaver had introduced the beautiful cone of

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[26] Elsdon Best, The Art of Whare pora Maöri flax weaving: Trans. N. Z. Institute, xxxii. A. Hamilton, Maori Art, quotes largely from Mr. Best's essay. See also the Reports of the New Zealand Flax Commission. Sir James Hector, Phormium tenax, 1892.

Mt. Egmont in a triangle as easily recognized as the innumerable representations of Fujiyama in Japanese decoration. In the lower example in the same illustration, No. 1590, the white and glistening fringe admirably sets off the black body of the kete, through which are woven patterns of the Maori tribal tatauing, and these patterns are not less interesting for their coincidence with many of those embroidered into their makaloa mats by the Hawaiian women as shown in Fig. 83. It may simply mean that a triangle is an easy figure for the technic of the mat, but the resemblance is there between the ancient decorative forms of the two Polynesian families now at diagonally opposite parts of the Pacific.

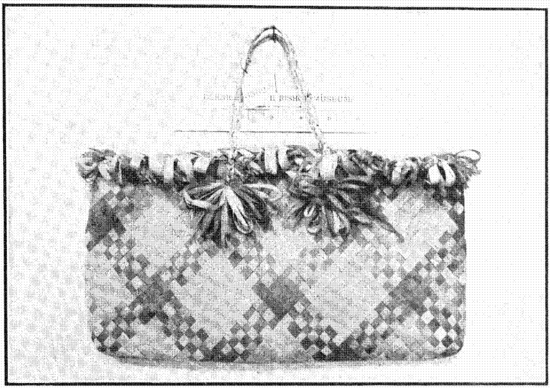

FIG. 94. MAORI BAST SATCHEL.

Many pages might be devoted to a description of the various ways in which the long flat leaf of the Phormium is used in garments waterproof and ornamental, of which this Museum has a fine collection, but these are not strictly either mat or basket work, and we must pass to the use of the leaf in basketry where it takes the place of the pandanus of warmer climates. Fig. 93 shows several of these and they are still made of every size and variously decorated. The larger ones in the illustration, Nos. 7585–86, are woven inside out from the bottom and then turned, leaving a rough seam within. No. 7588 is, I think, made of Nikau palm. The two small satchels are woven without the bottom seam. The handles of all except the bottom one are of harakake fibre; of that the handle is of twisted leaf. The leaves of the so-called cabbage-palm (a *Cordyline*) are also used in making these satchels and for other similar purposes, but they are not so flexible as the harakake leaves.

It is not only the leaves but the flower stems that are useful in Maori mat work, for the panels between the sculptured slabs in the carved houses of the Maori are made of these cylindrical sticks combined in great variety.[27] This is due either to alternations of color in the sticks, or depends on the arrangement of the strips that bind these together. New Zealand is often described as a group possessing a wonderful variety of woods both useful and ornamental, and I am tempted to give a single example of what might be regarded as a refined "splint" basket. Fig. 94 shows No. 6562 which is simply woven of the bast of *autetaranga* (*Pimelea arenaria*). It is light and perhaps flimsy, but none the less artistic and attractive even as a mere ornament.

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[27] Hamilton, *loc. cit.*, p. 86, Pl. xiii. These panels were called *tukutuku*.

Fibre Mats.—Passing again from the Hawaiian group, where mats of fibre were not made, to Samoa, a group so closely allied to the Hawaiian in language, customs and physical form, we find the fibre of the bast of the fau (Samoan *fau*, Hawaiian *hau*=*hibiscus*) used for fine mats which were greatly valued. The Hawaiians knew the hau and used its fibre for many textile purposes, but did not reduce it to its constituent fibres, a process well known to their southern brethren. Far to the west of these Polynesian groups the people of Micronesia, as we shall see presently, made great use of the hibiscus bast divided into fine strips, although not made into threads as in Samoa. On the latter group the *ie sina* were woven by hand, without implements, and while sometimes made of the unbleached bast strips, as No. 2193, in this Museum, they were usually of fine thread made by pounding the bast and then bleaching the fibre until it is as white as well cleaned banana fibre. In No. 2186 the finished mat is dyed with ochre or some other dye producing a red-brown color.

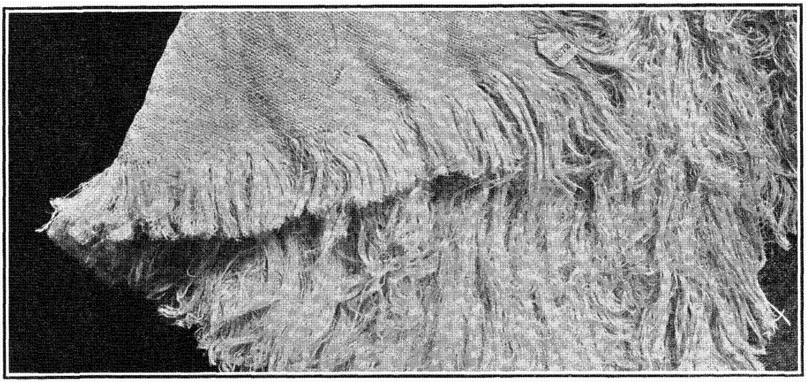

FIG. 95. IE SINA, SAMOA.

Not only were these mats of comparatively fine weave, but their substance was more than doubled by a nap or pile put on after the mat was woven by passing a parcel of the fibres with a full turn about a mesh of the mat at suitable intervals, and these can be pulled out only by loosening the loop formed about the mesh; pulling on the ends only tightens the hold on the mat. The length of this nap was variable, but in

No. 3570 it is seven inches, and the resultant mat looks like a sort of vegetable fur, as may be seen in Fig. 95, and like fur would make fairly warm and comfortable garments. For presents these mats were greatly valued, but their use in the curious "Tokens of Virginity" custom adds especial interest to the ethnologist, and it is not uncommon to find them stained with human blood. Of those in this Museum the following list shows size and fineness:—

SAMOAN IE SINA IN THE BISHOP MUSEUM.

2193. 4 ft.×3 ft.—9 to inch. Unbleached, unheckled bast.
2185. 5 ft.×3 ft.—17 to inch. White, fine fibre.
3570. 6.1 ft.×4.2 ft.—11 to inch. White, fine fibre.
3571. 5.7 ft.×3.7 ft.—9 to inch. White, fine fibre, coarser weave.
3572. 6.7 ft.×3.5 ft.—13–18 to inch. White, fine fibre, repaired.
2186. 4.7 ft.×3 ft.—10 to inch. Dyed, fine fibre.

The weave is so loose that it is easy to increase the width at the expense of the length, so that the measurements are approximate only.

Loom-woven Mats.—From the Gilbert Islands on the east to Guam on the west we find a rude but efficient loom for weaving fine mats, while throughout Polynesia no looms are used, and deft fingers must plait together the strands of whatever material to form a mat. With leaf strips or grass stems this is not very difficult, but with fine flexible threads the difficulty is increased, and the finer the thread the greater need of some mechanical assistance which the loom bars, however simple, and the shuttle afford. Two types of weaving apparatus are found in this region, one which is a loom in all its features, from which can readily be traced the more complicated forms of the modern textile art, and a specimen from Ruk in the Caroline Islands is shown in Fig. 96; the other, which, so far as I am aware, is confined to the island of Kusaie, is a very different contrivance, and although I have two specimens in the Museum before me, I cannot understand fully its working, nor have I been able to gather from those who have visited Kusaie any intelligible facts regarding its employment, and of this type Fig. 98 presents an example. Under ordinary circumstances one should be able, when he has the tools used and the finished product, as in the present case, to connect the two, but in this I have failed, and the Masters Finsch, Kubary and Parkinson, who have explored that region with ethnological skill, have failed to help me. The latter gives a full and interesting account of the first loom,[28] and from his account I shall take the liberty of quoting all that may explain more fully the loom before us and its work. It is interesting to find that on this island of Ontong Java, which was named by Tasman in

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[28] Nachtrage zur Ethnographie der Ongtong-Java-Inseln, B. Parkinson: Archives Interna. d'Ethnographie, xi, p. 207. In a note on p. 242, a figure is given to show the horizontal position in which this loom is used.

1643, although previously seen by Mendaña, the inhabitants appear to be of Polynesian origin (and the figure of the weaver referred to in the note is strongly Polynesian), and the men are the websters, while in Polynesia proper the mat weaving is the women's work. Here then is a Polynesian family who have adopted the loom of their neighbors without alteration or improvement, and the question not unnaturally arises how it is that none of the other tribes did the same thing, if they all entered the Pacific through the western gate?

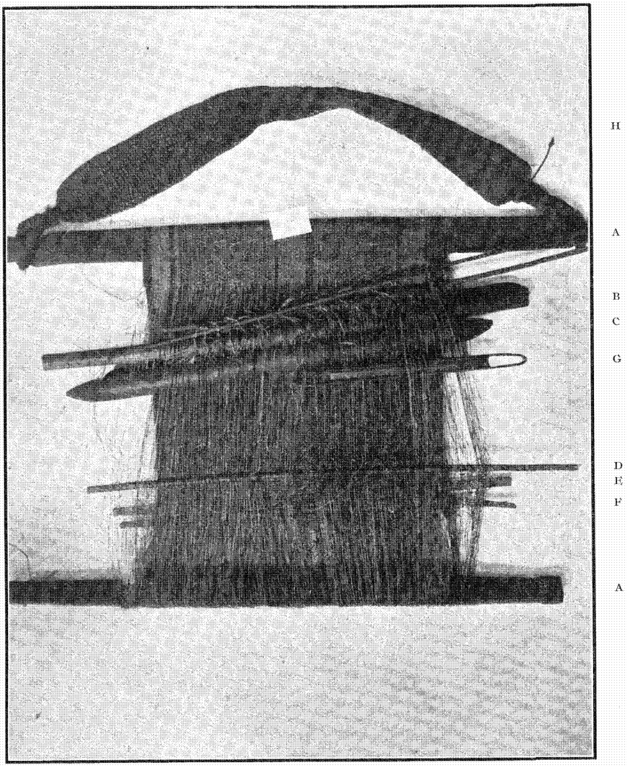

FIG. 96. LOOM FROM CAROLINE ISLANDS.

In all these simple looms the warp-beams are two sticks of equal and suitable length called *o*. In the simplest form in this Museum these are lengths of the light and smooth stem of some large palm leaf, but in the better one figured they are of heavy wood cut with some care and knobbed at the ends (Fig. 96, A). The widest of these seldom exceed three feet, and those of Santa Cruz are hardly a third of that length. Around these pass the longitudinal fibres or warp; these are continuous and slide on the beam. The length of the warp determines the length of the mat, and the number of warp threads its width. The beams armed with the warp are stretched in a horizontal position, one being held by cords passed around a post or tree, and the other by a belt or sling (H) which passes behind the back of the weaver, who is seated on the ground, so that he can easily regulate the tension on the warp. There was no yarn beam and cloth beam as in American and European looms of higher development; the whole fabric, warp and completed mat, was free to move over both beams like an endless apron. A similar arrangement is found in the Zuñi loom.[29] The slings are called *ku'u*. Next the weaver are two bambu sticks, about an inch wide, called *api* (B), thrust through the warp, so as to separate this into an upper and under layer. This would be sufficient in the simplest loom, but usually a rude heddle or harness, *ua*, (the sticks next the upper beam in the figure), consisting of a thin stick with a continuous cord looped along its length, and through these loops every other thread is passed before the loom is set up. In more complicated looms there are often many of these heddles through which varying portions of the warp pass and which are lifted at suitable intervals by machinery. In our present loom this motion is by hand, and it operates to "form a shed" by raising alternate threads from their neighbors far enough to allow the shuttle, *si'ia* (G), on which the filling or woof, *ogo si'ia*, is wound, to be thrust between the two layers from right or left. When the shuttle has passed, the third process comes into play,—the thread left in the shed (lay) is beaten up with a lathe or batten (D). Often the shed is formed, as in the loom from Ontong Java, by a sword-shaped strip of wood, *laga*, which the weaver holds in his right hand and therewith separates the layers of the warp so that the shuttle can easily slip through, and also serves to press the last thread of the woof close to the preceding one. This cycle constantly repeated completes the weaving. Of course the threads that were lifted for the first passage of the shuttle with the woof are depressed for the next passage, or, what amounts to the same thing, the others are lifted by being passed through another harness. When the shuttle is emptied of filling another is substituted, and the junction of threads is made by a neat knot precisely as in the more complicated loom of modern factories.

That my readers may have the full benefit of the German description, I give here the important portion of Mr. Parkinson's account:—

> Die einzelnen Theile des Webeapparats auf Ontong-Java folgen in nachstehender Anordnung. Die Kettenfäden (*Hau*) sind um zwei runde Hölzer geschlungen, welche etwas länger sind als die Breite der herzustellenden Matte. Diese beiden Hölzer werden *O* genannt. Das ein wird mittelst einer Schlinge oder eines Bandes, an beide Enden des *O* verbunden, an einen Pfosten befestigt; das andere Holz hat ein ebensolches Band, welches der auf dem Boden sitzende Weber um die Taille legt, wodurch er es in seiner Macht hat die Kettenfäden straff anzuziehen; diese Schlingen werden *Ku'u* genannt. Dem Weber zunächst sind zwei etwa 2-3 cM. breite Bambusstäbchen (*Api*) durch die Kettenfäden geschoben, so dass sie diese in eine obere und in eine untere Lage trennen. Dan folgt ein dünner Stock (*Ka'o*) an dem, durch eine fortlaufende Fadenschlinge (*U'a*), die untere Kettenlage befestigt ist, so dass, wenn das Stöckchen gehoben wird, die untere Kettenlage über die

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[29] Otis T. Mason. A Primitive Frame for Weaving Narrow Fabrics. U. S. Nat. Mus., 1899, p. 492.

öbere gehoben wird, und man dann das Schiffchen (*Si 'ia*) mit dem Einschlagfaden (*Oao si'ia*) von rechts oder links hindurch stecken kann. Hinter dem *Ka'o* folgt ein ziemlich dicker Holzstab, manchmal auch ein dickes Stück Bambusrohr (*Porogu*) welches die Kette trennt und mit dem *Ka'o* zusammen dazu dient, die Kettenschichten abwechselnd zu heben und zu senken. Nach dem *Porogu* folgen abermals Zwei schmale *Api* wei zu Anfang. Zu dem Webeapparat gehört ferner noch ein schwertartiges Instrument (*Laga*) welches der Weber in der rechten Hand hält und damit die Kettenfäden trennt so dass er das Schiffchen bequem durchschieben kann, ferner auch um damit durchgeschobenen Einschlagfaden fest an die vorhergehenden anzudrücken.

Die Herstellung der Kette erfolgt nun folgendenmassen. Die einzelnen Theile des Apparates werden theils in den Fussboden der Hütte fest eingesteckt, theils von Gehilfen in Position gehalten. Zunächst schlagt man in den Fussboden die zwei *O* fest ein, etwas weiter aus einander, als die Hälfte der Länge der herzustellenden Matte betragt; manchmal nimmt man statt der *O* auch zwei dickere Stöcke und ersetzt sie später durch die *O*. Von unten anfangend legt man nun den Faden um diese Stäbe, schiebt aber zugleich die übrigen Theile des Apparats mit hinein, nämlich die vier *Api* (je zwei), den *Kao* und den *Porogu:* der *Kao* wird gewöhnlich auch in den Fussboden eingeschlagen, die übrigen Theile von Gehilfen festgehelten. Der Faden wird nun so umgelegt dass er abwechselnd über oder unter den *Api* und dem *Porogu* läuft, wodurch die Kette in zwei Lagen getrennt erhalten bleibt.

Höchst sinnreich ist nun die Anordnung wodurch bewirkt wird, das man die untere Kettenlage abwechselnd über die öbere heben und darunter senken kann. Dies wird bewirkt durch den dicken Stab *Porogu* und das Stäbchen *Ka 'o* mit den Schleifen *U'a*. Alle Kettenfäden laufen unter dem Stab *Ka'o* fort, jeder Zweite Kettenfäden wird durch eine lose Schlinge an den *Ka'o* befestigt, so dass der Weber es in seiner Macht hat durch Heben des *Ka'o* die untere Kettenschicht über die öbere zu heben. Der Weber setzt sich auf den Fussboden und spannt die Kettenfäden wie oben beschrieben an. Ihm zunächst liegen die beiden schmalen Latten *Api* die an beiden Enden durch einen Faden mit einander verbunden sind. Er fasst nun mit der einen Hand, den Stab *Ka'o* und hebt denselben, wodurch die untere Kettenlage über die öbere empor gehoben wird, nun steckt er das breite, dünne und sehr glatte Schwert, *Laga*, eurch die entstandene öbere und entere Schicht und dreht dasselbe um, so dass die Kanten nach oben und unten stehen, nun schiebt er das Schiffchen mit dem Einschlagfaden durch, legt das Schwert flach und schlägt den Faden leise, an worauf er das Schwert herauszieht. Jetzt schiebt er den *Porogu* etwas von sich ab, ebenso den *Ka'o* wodurch er bewirkt dass die frühere obere Kettenlage die untere wird; das Schwert wird wieder durchgesteckt, ebenso das Schiffchen, und der Einschlagfaden angetrieben, *Porogu* und *Ka'o* schiebt der Weber nun an sich heran, hebt den *Ka'o* so dass die Kettenlage wieder nach oben kommt und auf diese Weise geht es nun fort bis die Matte fertig ist. Ein geschickter Weber kann in drei bis vier Arbeitstagen, jeden von Sonnenaufgang bis Mittag gerechnet, eine, Weibermatte fertig stellen.

By arranging the warp threads of different colors longitudinal bands were formed, and by varying the color of the filling on the shuttle transverse stripes were produced; the former were more common. Twills or other fancy patterns could be introduced by increasing the number of harnesses or by raising, instead of alternate threads, two, three or more adjacent ones. This loom gave opportunity for decorative weaves that were early discovered, and some of the results on the mats of the Carolines used as women's dresses are shown in Fig. 97.

Both hibiscus and banana fibre were used in this mat weaving, as may be seen in the list of mats in this Museum given below. There are specimens of the same pattern in hibiscus from Guam and the Gilbert Ids., and if we did not know they were made in both places it would be easy to imagine their transport as merchandise for

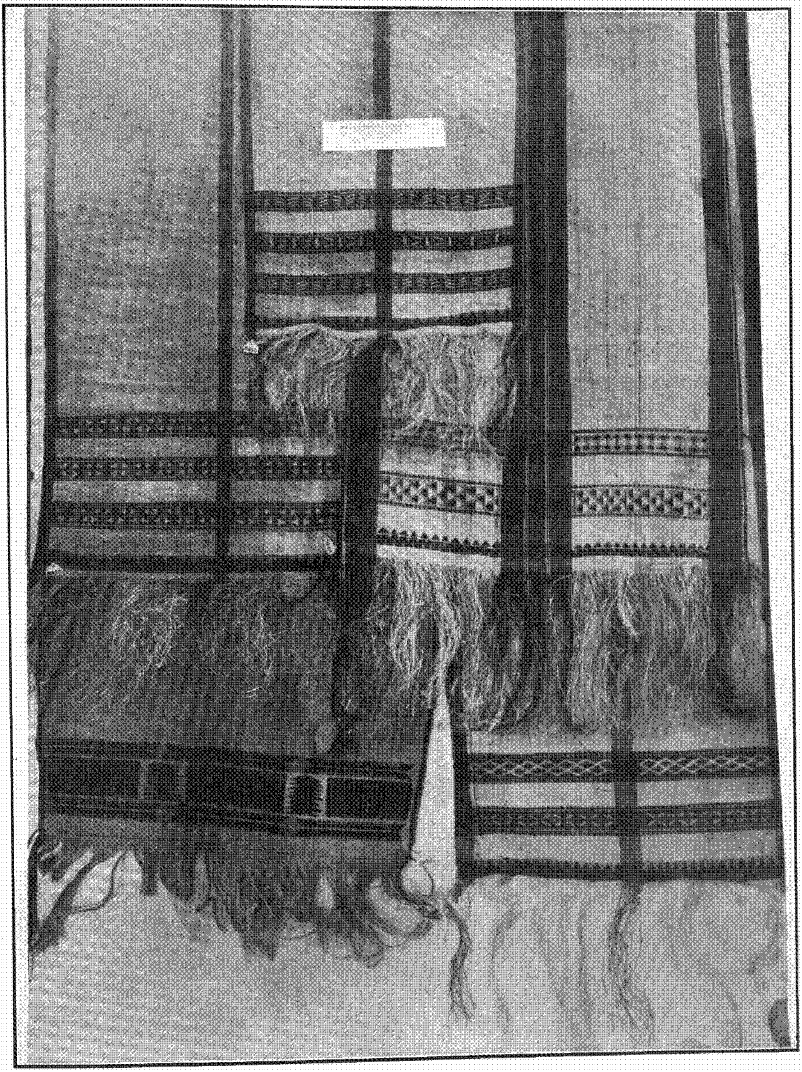

FIG. 97. MATS OF BANANA FIBRE, CAROLINE ISLANDS.

barter from one group to the other. Of the finer banana mats we have specimens from Ruk in the Carolines, Santa Cruz in the New Hebrides, and Niuë. The Santa Cruz mats are remarkably well made and tastefully decorated, and are sometimes narrow and long, with pleats and tufts for additional ornament. The beauty and durability of these banana woven mats are so marked that it is surprising that a trade to foreign countries has not been developed. I do not know what the condition of the native manufacture may be at present: perhaps, like so many good things of Pacific art, they have passed by to give place to the cheap calico that civilization has brought upon the islands.

The Tol.—Besides the loom just mentioned, the people of Kusaie in the Caroline Islands have another contrivance, by no means an orthodox loom, but still a "webstuhl," as our German friends might call it. To begin with, the writer must again confess he has never seen the instrument used, nor has got any intelligible information from any one who has, and in saying this he would disclaim any intention to speak disrespectfully of the little machine or of the intelligence of those who would have enlightened him, if possible: it is simply in apology for not handing on in these pages some intelligible explanation of its working habits. The machine, as will be seen from Fig. 98, is a biped with a long straight body, on top of which are inserted loosely certain pegs, around which are wound threads of banana fibre colored to suit the work in hand. Other spools of this fibre are at hand, if we can dignify a mere length of bambu, around which the thread is wound, with the name of spool. Then there is a frame which may possibly serve as the harness in an ordinary loom; there are shuttles of good form, and battens of considerable weight to drive home the woof or filling, and there are clam shells to serve as scissors. The threads, whether for the warp or woof, are of well cleaned banana fibre dyed in various colors, and in lengths of about five feet. To obtain the continuous length of thread these are neatly tied together by a double and almost invisible knot.

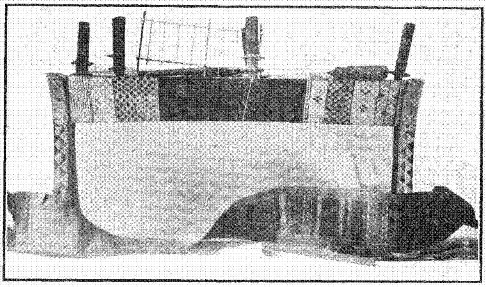

FIG. 98. FRAME FOR TOL WEAVING.

I have given the machinery, and I am forced to give the result without the intermediate processes. There are two of these "looms" in this Museum, differing in size and ornamentation, but each provided with the same attachments, and it is a subject of regret that there is not with either machine a partly finished girdle or tol. Apparently they are used exclusively for weaving the tol or girdle worn in former times by a man over his malo or waistcloth, and also for a similar but rather wider garment formerly worn by women. With both sexes the style of garment has yielded to the unpicturesque but cheaper garments of the foreign missionary or trader, and the manufacture has gone through the various stages of degradation that an obsolescent fabric always travels. When the native webster obtained from the foreign source worsted, he adulterated the banana fibre with the far less durable wool, and at the same time, or later, adopted the cheap foreign dyes. The old specimens, both of the tol and of the female dress or apron, show original and simple patterns, apparently of western (to them) origin.

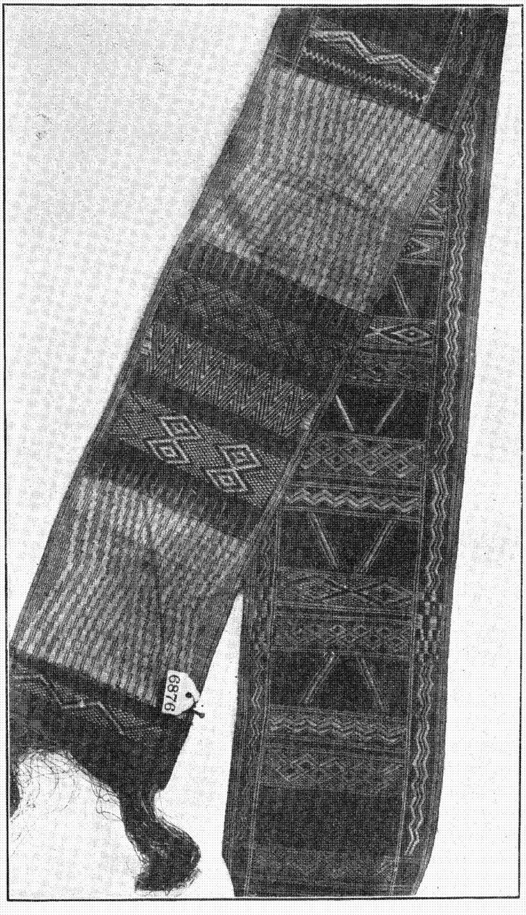

FIG. 99. TOL OF COMPLICATED PATTERN.

When we examine the fabric we find that, taking first the warp, this seldom exceeds six feet; in this the pattern is altered by tying together suitable lengths of the desired colors, and in this case the pattern is alike on both sides of the weave. Another way was also used, the common one of sinking the colored thread beneath others at intervals, and this was generally used in the transverse patterns, formed by the woof, the frame in some way facilitating the passage of the shuttle under any desired number of threads of the warp. The terminal fringe which is always found on at least one end, generally on both, if of a different color is tied to the warp threads, thread by thread. Unluckily the black dye used generally for the body of the aprons rots the fibre, and few old specimens are entirely perfect. In Fig. 100 are four specimens of this work, the first on the left being an apron in black; the others are old tols in red. The following list of those in the Museum will show the size, fineness and pattern.

LIST OF CAROLINE ISLANDS TOLS AND APRONS.

7842. 5.2 ft.×8 in.—58 to inch. Black apron from Kusaie. Ornamental portion in brown, red, black; 14 in. long at one end; at the other three yellowish stripes, one central of two strands, two lateral of one each. Fig. 100, No. 1.

6621. 6.1 ft.×4.8 in.—76 to inch. Tol from Ponape. Red, with double border of yellowish strands along each edge; ornamental end 16 in. of red, yellow, black; at other end 14 in. of yellow with seven single or double black strands. Fig. 100, No. 2.

6620. 5.6 ft.×4.5 in.—70 to inch. Tol from Ponape. Red, with seven transverse bands of yellow designs woven through, not alike on both sides. Fig. 100, No. 3.

6619. 5.4 ft.×4.5 in.—60 to inch. Tol from Ponape. Red, with borders of darker red and yellow and transverse bands woven through; end design alike on both sides. Fig. 100, No. 4.

6876. 5.5 ft.×4 in.—82 to inch. Tol from Ruk. Decoration in red, yellow, black. Fig. 99. A portion is rolled up and bound, to pass between thighs.

8799. 4.3 ft.×2.7 in.—58 to inch. Tol. Red and yellow, with nine transverse bands, all different.

6626. 5.5 ft.×4 in.—56 to inch. Tol from Ruk. Red, with yellow; longitudinal and transverse stripes coarsely embroidered with scarlet worsted.

Summary of the Basketry.—Before considering the net work of the Hawaiians, which has been so thoroughly studied by Mr. John F. G. Stokes, Curator of Polysian Ethnology in the Bishop Museum, that I have asked him to prepare the portion of this memoir relating to that handicraft, we may draw together the information we have been able to collect about the Hawaiian mats and baskets, and institute a brief comparison with similar work throughout the Pacific, although the material at our disposal is not sufficient to warrant much theorizing as to origin or relationship.

We find that the old Hawaiians made a basket (both Hinai ieie and Hinai ieie poepoe) much superior in workmanship and durability to any others made in the region under consideration; and these do not closely resemble the basketry of nations or tribes bordering on the Pacific. The Samoans made baskets of very different form, and no known specimens of their work are related to the Hawaiian baskets or could have served as prototypes. The Fijian and Micronesian baskets are closely related and show an occidental (to them) origin. The baskets of Australia are peculiar in form rather than material, and could not be mistaken by a student of basketry for those of any other country. The Solomon Islanders and New Hebrideans make baskets of mat-like consistency, quite unlike the Hawaiian, but also make genuine baskets of considerable perfection. The New Zealanders make baskets of a still different type, but their kete or satchels remind one of the satchels made by the Fijians and Gilbert Islanders, in shape, although not at all in material. It is difficult to see that Hawaii has taught other groups, or has in the least been influenced by their work. Even where the same material has been used, as in the case of pandanus leaf, the resulting baskets are of quite different forms. Even the baskets used for fish traps, when made in both countries from fern stems, differ in shape in Hawaii and New Zealand. The Samoan fish trap made of coconut roots is, it is true, not unlike the Hawaiian fern stem fish trap.

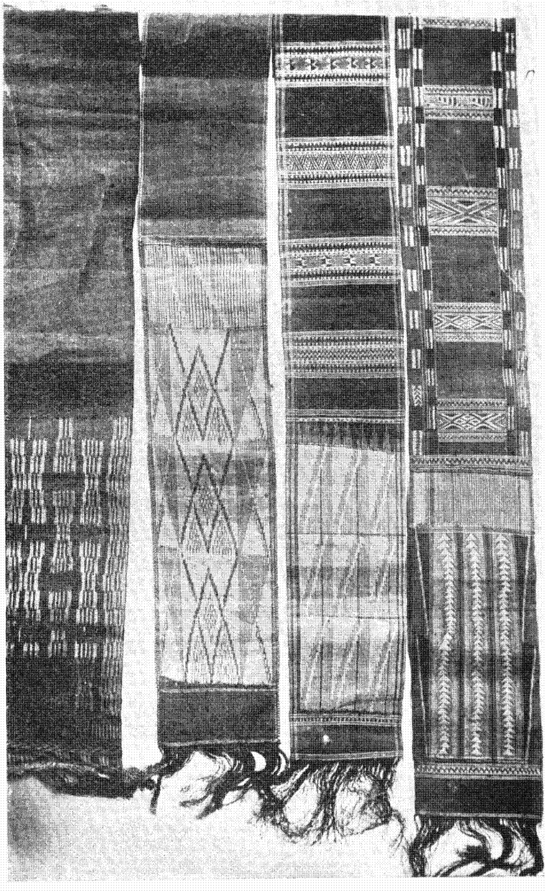
FIG. 100. APRONS AND TOLS.

All through this region the baskets, with the exception of the rude coco leaf frails, differ sufficiently from those of other countries besides differing among themselves. Generally speaking there are few forms which could advantageously be adopted by other countries, or be made articles of commerce. Like the peoples who made them, and whose wants they doubtless supplied well enough, they seem to be passing off the stage, and most of them have become even now material for museums.

With mats the case is somewhat different. Wherever on the Pacific islands the pandanus grows its leaves were used for mats, and were prepared much in the same way, to be woven in the same manner, into mats hardly differing among the groups. We can go beyond the Pacific region and find the same mats wherever we find the pandanus, but when we rise above the plain coarse mat we find more or less differentiation in the finer work. Then the material accessible, as in the case of the basket, influences the form, and we have seen by illustration that it is by no means difficult to distinguish, in most cases, the place of manufacture.

While Hawaii leads in the manufacture of baskets (in the olden time), and has produced most durable mats in the makaloa class, Hawaiian mat work cannot rank with the Micronesian fibre mats, nor perhaps with the fine mats of the Samoans. Maori mats were much more artificially made than those of the southeastern Pacific islanders: Tonga alone held a good place in the mat making industry after Samoa. In the northwest, the Solomon Islanders and the New Hebrideans were more noted for their basket work than for mats; and in New Guinea, so far as I am aware, neither mats nor baskets were notable. It is probable that the bags of netting, for which New Guinea is to be credited, took the place of baskets.

We have seen that the partial use of mats for dress was general throughout the Pacific, although only in New Zealand did the mat become the most important part of one's dress, for there the cool wet climate compelled more covering from the weather than on the tropical islands of the rest of Polynesia, where the more pliant kapa became the most important material for clothing.

Note may be made that while the universal form of pandanus mat showed little variation throughout eastern and central Polynesia, on the western islands of the region there are curious adaptations of the material unknown to their eastern neighbors. These have mostly been figured, and it will be seen that they are of rather primitive character.

Mats were articles of exchange or commerce far more than ever baskets were, and hence we find them wherever the adventurous canoes of the early voyagers touched shore; and while this fact has made it more difficult to distinguish the origin of some mats, the material being everywhere the same, it has tended on the other hand to preserve mats rather than baskets of former times in our museums, for as common articles of barter they were brought everywhere to the early European and American explorers of this ocean, and being portable were brought home.

No dates can be assigned to any of the methods used or patterns produced in Pacific basketry, nor can it be declared which branch of the Polynesian family originated or taught any especial manufacture either of basket or mat. Legends are merely indications with little or no historic value.

The study of both mats and baskets of the Pacific is far from complete, and if it were possible to make larger and broader collections, much that is interesting and also valuable would be brought to light. In all branches of basketry pertaining to our region this Museum is constantly making collections, but at present only the Hawaiian division seems fairly complete.

Hawaiian Nets and Netting. *By* JOHN F. G. STOKES, *Curator of Polynesian Ethnology in the Bishop Museum.*

AS WITH most, if not all, primitive races, the Hawaiians had a knowledge of the art of netting which they had brought to a high standard of excellence before the general influx of the foreigners. They had even gone so far as knitting, making a very complicated knot without tools. If mat making evolved the loom, then netting was the forerunner of lace making, but the natives' art had not reached this point.

Nature has been bountiful to these people in its supply of raw material for their cord, giving them the fibrous husk of the coconut, the sedge *ahuawa* (*Cyperus lævigatus*), and the bast fibres of the *hau* (*Paritium tiliaceum*), *waoke* (*Broussonetia papyrifera*), and, most valuable of all, *oloná* (*Touchardia latifolia*), which is very strong, light and durable. In addition to the foregoing, several grasses were pressed into service for braiding into ropes for house building. And human-like, discontented with much, or perhaps pandering to the love of ornamentation, or, it may be—let us allow for higher sentiments—wishing to keep in memory dear friends, human hair was frequently braided or twisted into patterns in many of their ornaments. In more modern times, horsehair has been spun and used with other cord in some of the *koko puupuu*.

The preparation of the coir was simple, merely requiring the separation of the fibres of the husk, and, when spun or braided into cord, was highly esteemed for the lashing of canoe outriggers on account of its presumed durability in salt water. For fish nets it was seldom used, not being as strong nor as pliable as the more favored oloná, but for the koko it was applicable and used extensively as well as for the cordings attached to certain gourd vessels. Coir would be prepared, twisted and worked into a koko in the same day. This was no doubt necessary, as the fibres, when dry, are very stiff and would be difficult to twist into the close meshes of some of the nettings in which coir is found.

Ahuawa, common on the banks of the taro ponds, was prepared by drawing the freshly plucked stem between two rounded sticks tightly compressed for the purpose of removing the juices, and heckling, and then spinning the fresh fibre into cord for the koko. This fibre was also used for tying on the thatch to the grass house.

The hau, waoke and oloná were prepared similarly, being partly macerated in running water and scraped with a piece of pearl shell or turtle rib.[30] This would be a process of a few days.

The waoke, used so largely in the manufacture of *kapa*, was restricted in cord to the making of koko and ornamental rope. The filaments are soft, clinging, and of only moderate length, and while thus well suited for bark cloth they would not last in such fabric as fish net.

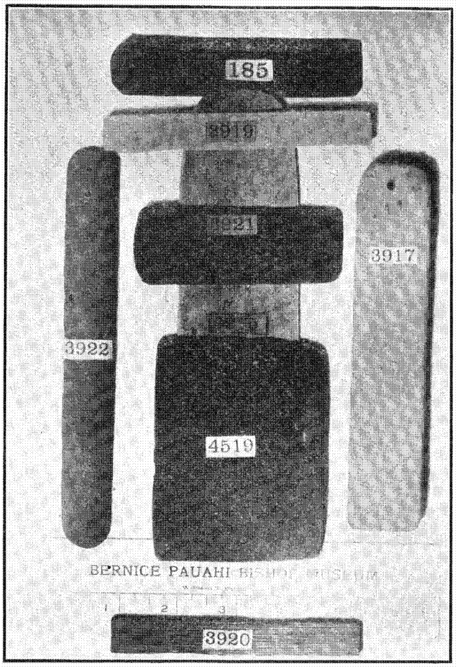

FIG. 101. MESH GAUGES.

The hau, a hard fibre, had employment as heavy rope mainly, but rarely in fish netting or koko, while the oloná was the best used material for fishing lines and nets, also occasionally finding its way into the better class koko.

The grasses were braided with little or no preparation, the work being done while the material was green. The spinning of cord, *hilo*, was always done on the bare thigh by women, the native terms for the process being *hoaha* for coir and *hoaho* for other cords. Men generally attended to the braiding.

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[30] Memoirs B. P. Bishop Museum, Vol. I, p. 50, fig. 43.

The tools used were, the mesh stick or gauge (Fig. 101) and the shuttle (Fig. 102), made of whale ivory and rib, human and quadruped bone, tortoise shell, wood or bambu.

The gauge, *haha*, is a short, thin, flat implement of varying widths. In describing a net, the native put his fingers into the *maka* or mesh, and if the first finger filled the space, the mesh was *makahi*; if three fingers were needed, then the mesh was *makolu*, etc. For sizes between, the words *oene* or *oa* were added to the name of the smaller mesh. The following is a table prepared for the writer by a native fisherman, with the sizes approximated:

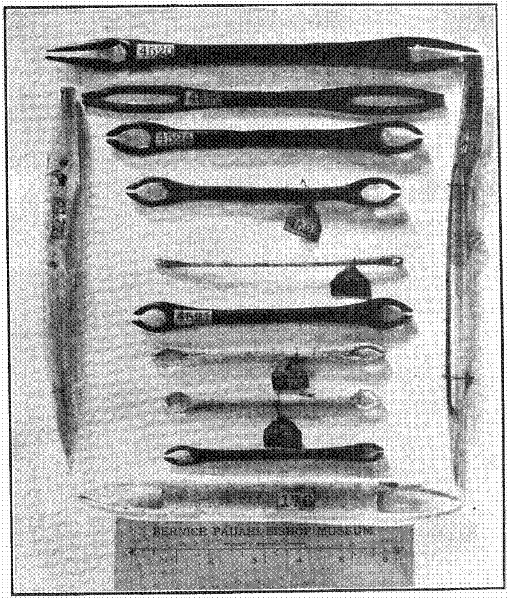

FIG. 102. SHUTTLES.

Nae, ¼ in.
Nukunukuaula, ½ in.
Makahi,[31] 1 in.
Makahi oene, 1½ in.
Malua, 2 in.
Malua oa, 2½ in.
Makolu, 3 in.
Makolu oa, 3½ in.
Maha, 4 in.
Mahae, 4 in. and upwards.
Malewa, 7 in. and upwards.

The shuttle, *hia*, is found in two distinct shapes. The more highly esteemed was the form, world wide in adoption, composed of a shaft with an eye at each end, the outer edge of which was cut away to admit the cord. The shank of this is round in cross section and diminishes toward the middle, making a more effective tool than that with the flattened or grooved shank, for the native implement allowing of a cylindrical winding could pass more cord through a given mesh. The natives were always very careful when filling their shuttles, passing the cord straight up and down along the shank, then winding on one side crossing the cord and repeating on the other, to attain the cylindrical form.

The other form, *kioe*, better known as a net mender, is a round stick of wood about one-third of an inch in diameter and six inches long. The stick for about one-third of its length has been cut down, leaving a shoulder, and tapered to a blunt point (Fig. 103, A). There are two specimens in a loan collection in the Museum which are exceptional, having the butt only one-third the total length (Fig. 103, B). To fill this style of needle, two half hitches were passed around the tapered end and a loop made around the fingers of the hand holding the tool, as shown in the same figure. For very fine nets a *niao*, piece of the midrib of a coconut leaf, was substituted for this form.

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[31] Contraction for maka, and the numerals akahi, alua, akolu and aha. The enclitic *e* on mahae means other, or another. The names *maha* and *malewa* do not seem to be generally known among the natives.

In making the large-meshed, coarse nets for sharks or turtle, neither shuttle nor mesh stick was generally resorted to. The cord was wound over the hand and elbow for several turns, the hank thus formed doubled and wound with the rest of the cord until a pear-shaped ball was made. The cord could then be drawn from the inside through the point of the ball, which retained its shape until expended. The cord in this form took the place of a shuttle, while the spacing was roughly done by the hand. A similar winding, but more spherical, was in vogue for the fishing lines.

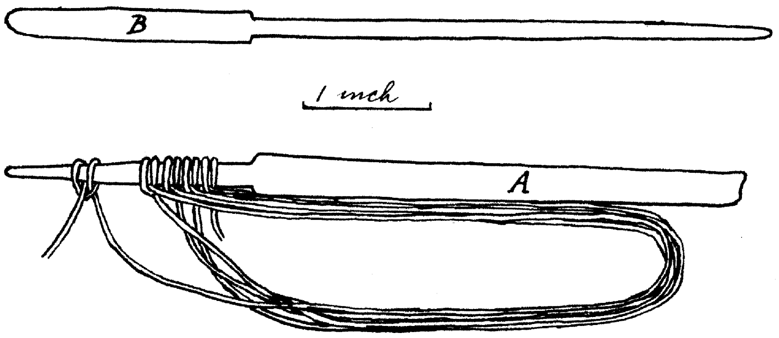

FIG. 103. NET-MENDERS.

For fastening two nets together temporarily, there was a needle of bone or wood with an eye towards the end. The needle and line were merely run through the opposing meshes and the nets thus drawn together. A similar needle was also used for sewing the top sheet of kapa to those beneath. Frequently when fishing it was necessary to join two nets below the water, for which purpose this needle or the net-mender was requisitioned, but native fishermen have told the writer that the quickest and simplest way was to dive down and tie the ends with split stems of the *ki* leaf (*Cordyline terminalis*).

In Fig. 102 are shown three specimens, Nos. 176, 5177 and 5178, which certainly do not owe their origin to Hawaiian hands. The native mind is a peculiar one in regard to specimens of former arts. Any implement a man in his childhood had seen his father use is looked upon in later years as very ancient indeed, and is honestly believed by him to have belonged in succession to his forbears far down in the misty flights of time. This impression of the writer was not entirely gathered from observation of the natives bringing specimens for sale to the Museum. When articles were so offered, the natives almost always claimed that such were used by or in the possession of Kamehameha the Great, with the mistaken idea of securing a higher price.

They were right in their contention, though they had perhaps forgotten that their grandfathers admitted that the king owned the heavens and the earth, the sky and the sea and all therein contained.

Specimen No. 176 was purchased by an antiquarian collector, of good repute, as a Hawaiian shuttle, and with it came the following interesting history:

> "Made of the shinbone of Kuliakalanaia, an expert fisherman of Kohala, Hawaii. He was also a man without hair on his limbs. For these reasons his bones were wanted for fish hooks, etc., and he was therefore murdered for his bones. Lualauoho, an aipuupuu of Kamakahelei, secured the inner bone of the right leg as his share of the spoil. From it he made this ka [hia], tatting shuttle, which he very greatly prized on account of the good luck it brought his nets. On his death it passed to his son Kama who was also an aipuupuu of the same chief. Kama died at Hoopuloa, April 10, 1886, over a hundred years old, the wealthiest native in Kona, when this ka was left to his grandson G. L. Walia Kealiikuli, who resold it February 12, 1887."

That such a value was set on implements of human bone was entirely correct, and there is little doubt in the writer's mind that the last native possessor believed the history submitted; but on finding the material to be ivory and referring a sketch of it to Professor O. T. Mason, that gentleman pronounced it an "Eskimo netting needle." A comparison with shuttles figured in Nelson's work on "The Eskimo About Bering Strait"[32] will confirm this. From about 1837 until a few decades ago the Hawaiian Islands were the wintering quarters for the whaling fleet operating off the coast of Alaska and in the Bering Sea, and with it many native seamen shipped for the summer cruise.

The other specimens, Nos. 5177 and 5178 were acquired in part of the collection of the late Queen Emma labelled "Ivory tools for netting koko and ieie baskets." They were shown to several of the older natives, and while some did not recognize them, others claimed them to be Hawaiian implements but were not familiar with their uses. Each specimen consists of two pieces: the larger is a slightly curved implement with the outer arc notched at the butt end, smooth, rounded and decreasing in thickness until the sharp point is reached: on the inner side, from the point to the first barb, is a knife edge; from the first to the second barb, and from the second for about one-quarter the length it is curved, smooth and rounded, the remainder being straight and plane. About one-quarter the length from the butt end is a rectangular hole. This was identified by Professor Mason from a sketch as the side prong of a Hudson Bay spear point; and, since Nelson reports a similar one from St. Lawrence Island,[33] these specimens no doubt reached Bering Strait through trade and by the same means the native sailors acquired them and brought them here. The smaller implements are somewhat similar to the marlinspikes used in netting and figured in the same paper from Cape Nome,[34] and each implement is provided with the spur-like projection mentioned therein.

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[32] Eighteenth Annual Report of the Bureau of American Ethnology, pl. lxxiii.

[33] Pages 149 and 150, fig. 42 (8), of the same work.

[34] Page 193, pl. lxxii, figs. 19 and 20 of the same work.

There are four long clumsy shuttles made of pine in the Museum's collections, used by natives, averaging about 13 inches long. The shafts of these are rounded, and the points of the eyes thick and square. In each, 2.5 in. from an end, is inlaid a small piece of lead. They are certainly not Hawaiian, and the locality of their origin is not at present known to the writer.

Doubt has also arisen concerning the origin of some of the gauges, for the native mesh stick was very thin, seldom or never thicker than one-tenth of an inch, and No. 3917 (Fig. 101) is over .3 in. thick. However, the characteristics of Hawaiian mesh sticks are not strong enough for fully satisfactory identification. Specimen No. 3915 was at one time 4.8 in. longer, and from the end of it No. 3916 has been sawn or cut off, as certain marks on the two specimens testify, and used separately. Probably No. 3919 came from the same source. The total length of the original specimen, 12 inches, must have made a very awkward gauge for use.

The following is a list of Hawaiian netting tools in the Museum:—

GAUGES.—HAHA.

185. Tortoise shell. Length 4.2, width .98 inches.
3915. Whale rib. Length 7.2, width 2.1 in.
3916. Whale rib. Length 4.8, width .8 to 1.1 in.
3917. Whale rib. Length 6.2, width 1.3 in. Very thick.
3918. Bone, human(?). Length 3.6, width .9 in. Rather thick, edges lightly and evenly serrated.
3919. Whale rib. Length 4.5, width .6 in.
3920. Bambu. Length 4.2, width .6 in.
3921. Tortoise shell. Length 3.5, width 1.2 to 1.3 in.
3922. Tortoise shell. Length 6.8, width .85 in.
4519. Tortoise shell. Length 3.8, width 2.9 in.
6795. Naio(?) wood (*Myoporum sandvicense*). Length 5.5, width 1.1 to 1.3 in.
9033. Tortoise shell. Length 2.9, width .5 in.
9034. Tortoise shell. Length 4.3, width .88 to .98 in.
9035. Tortoise shell. Length 4.2, width 1.2 in.
L 183. Tortoise shell. Length 3.2, width 1 in.
L 184. Tortoise shell. Length 3.4, width 1.25 in.

SHUTTLES.—HIA.

176. Walrus tusk. Length 8.8 in. Originally Eskimo.
4470. Whale rib. Length 5.8 in.
4471. Whale rib. Length 5.6 in. Very narrow.
4520. Kauila wood (*Alphitonia excelsa*). Length 10 in.
4521. Kauila wood. Length 6.3 in.
4522. Bambu. Length 8.2 in.

4523. Naio. Length 6.3 in.
4524. Kauila. Length 7.2 in.
4525. Bone, human(?). Length 5.1 in.
4526. Pine. Length 12.8 in. Not originally Hawaiian.
4527. Pine. Length 12.8 in. Not originally Hawaiian.
4528. Pine. Length 12.9 in. Not originally Hawaiian.
4529. Pine. Length 13 in. Not originally Hawaiian.
6793. Naio. Length 6.4 in. One eye broken.
9030. Kauila. Length 5.3 in.
9031. Naio. Length 5.3 in.
9032. Naio. Length 4.9 in.
L 179. Kauila. Length 6.7 in.
L 180. Kauila. Length 7 in.
L 181. Kauila. Length 5.6 in.
L 182. Kauila. Length 7.9 in.

NET-MENDERS.—KIOE.

9036. Wood. Length 5.6 in., of point 1.8 in.
9037. Wood. Length 5.7 in., of point 2 in.
9038. Wood. Length 5.8 in., of point 1.9 in.
9039. Wood. Length 5.9 in., of point 2.1 in.
9040. Wood. Length 6 in., of point 2.2 in.
9041. Wood. Length 6.2 in., of point 2.4 in.
9042. Wood. Length 6.45 in., of point 2.25 in.
9043. Wood. Length 6.55 in., of point 2.2 in.
9044. Wood. Length 6.6 in., of point 2.3 in.
9045. Wood. Length 6.65 in., of point 2.2 in.
9046. Wood. Length 6.6 in., of point 2.15 in.
9047. Wood. Length 6.9 in., of point 2.4 in.
9048. Wood. Length 7.2 in., of point 2.3 in.
L 380. Wood. Length 10.2 in., of point 7.3 in.
L 381. Wood. Length 6 in., of point 1.8 in.
L 382. Wood. Length 6.1 in., of point 4.1 in. (Fig. 103, B.)
L 383. Wood. Length 5.6 in., of point 1.7 in.
L 178. Wood. (1) Length 5.9 in., of point 1.5 in.; (2) length 5.9 in., of point 1.8 in.; (3) length 5.9 in., of point 1.8 in.; (4) length 5.9 in., of point 1.9 in.; (5) length 6.1 in., of point 1.8 in.; (6) length 6.5 in., of point 1.9 in.

Hawaiian nettings can be almost as conveniently classified by their use as by their appearance, and in this article two main divisions will be considered, the bag or netting surrounding a utensil for the purpose of carrying, and the fabric similar to that known as fish net.

Netted bags include the koko or detachable net used to carry or suspend the *umeke*, wooden or gourd bowls containing food or clothing (Figs. 104 and 105), and the cord permanently attached to various gourd utensils as a means of fastening a handle thereto, generally known by the name of the cord, *aha* (Figs. 106 and 107).

Koko.—The koko is a bag, of cord netted or knitted, in the shape, when suspended, of an inverted hemisphere superposed by an elongate cone. In technique it was divided into three parts, Fig. 108, the first, following the order of the work, being *piko*=navel, beginning, *kumu*=root, or *hoomaka*=starting place. The term *poaha* has been applied to this part, and many of the piko when completed would be large enough to act as a poaha. The latter was a ring of rope or bound pandanus leaves, placed on the ground, on which the rounded bottom of the umeke would rest. The second or main part was often referred to as koko, but there was a technical word, *hanai*, to represent it;[35] the word *opu*=belly, any swelling surface, was also used for this part. The third, called *kakai* or *alihi*, was a cord interlooped, Fig. 113, with or knotted, Figs. 114 and 115, to the outer edge of the hanai in two series. The names kakai and alihi seem to have been used as frequently for the suspending cords of the koko, but since the name alihi is also used for the head and foot ropes of the fishing nets, it might be better to retain the name kakai for the koko. Each series was bound in the middle (ultimately the top) by a single smooth winding, and sometimes by half hitches, to make a *pu* (handle), and into these pu was the end of the *auamo*, bearing stick, thrust to carry the load, Fig. 153. The auamo, or *aumaka*, is a stick of hard heavy wood, generally *kauila* (*Alphitonia excelsa*), about six feet long and borne across the shoulder, Fig. 109; the ends drop a little below the middle and are either notched or neatly carved to hold the kakai, Fig. 153. For protection of food against animals, the koko was suspended from a wooden hook, *kilou*,[36] attached to the ridgepole of the hut, or from a crossbar shaped like a canoe and notched around the edges; this implement was called *oleole*[37] or *haka*, and was placed on the top of a pole set in the ground.

The work of making koko was done by one of the *kahu* or body servants of the alii. Frequently a kahu well skilled in such arts was in the service of the king, who, to show favor to his friends, would place the skill of the kahu at their disposal. Another source of manufacture was the common people, who brought great numbers of koko to the alii in payment of taxes, and after the best had been selected by the chief and his friends, the poor ones might return to the commoner.

Since this essay is intended to place on record this part of the natives' art now forgotten, and the usefulness of which has entirely ceased, and also to give a catalogue

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[35] Lorrin Andrews, A Dictionary of the Hawaiian Language. Honolulu, 1865.

[36] Edge-Partington and Heape: Eth. Album of Pacific Ids., Vol. III, Pl. XV, No. 1.

[37] Ibid., Nos. 2 and 3.

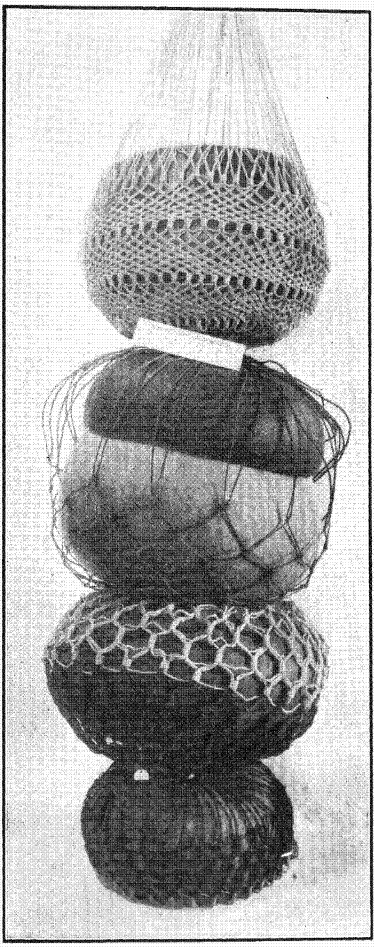


FIG. 104.

a. Koko puupuu, Hanai E.
b. Koko pualu, Hanai A.
c. Koko puupuu, Hanai D.
d. Koko puupuu, Hanai D.

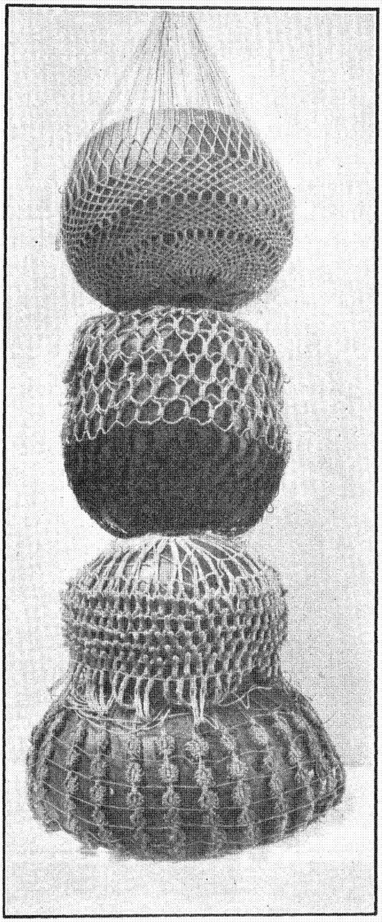


FIG. 105.

a. Koko puupuu, Hanai E.
b. Koko puupuu, Hanai D.
c. Koko puupuu, Hanai G.
d. Koko puupuu, Hanai K.

of what is now available in this Museum to students of ethnology, greater attention has perhaps been given to detail than a general description would call for. It has been necessary to make a liberal use of the native names, which at the present day are liable to be inaccurately applied. And again it has been found that sometimes in different islands of the group one name may be employed for different articles, and dissimilar names for the same thing.

Piko.—The piko is a ring of cord at the bottom of the koko, attached to which, by loops, knots or half hitches, is a row or circle of loops on which the hanai is begun. The habitual position of natives when doing all such work was sitting on the ground, with one leg over the other and the upper foot projecting slightly. From the big toe of this foot the cord was stretched, and the diagrams of the technique herein have been drawn as if in the same position, unless specially mentioned.

Of piko, there were observed fourteen forms in specimens obtainable, and in the following descriptions of the modes of operation the arrow heads point towards the shuttle or ball of cord.

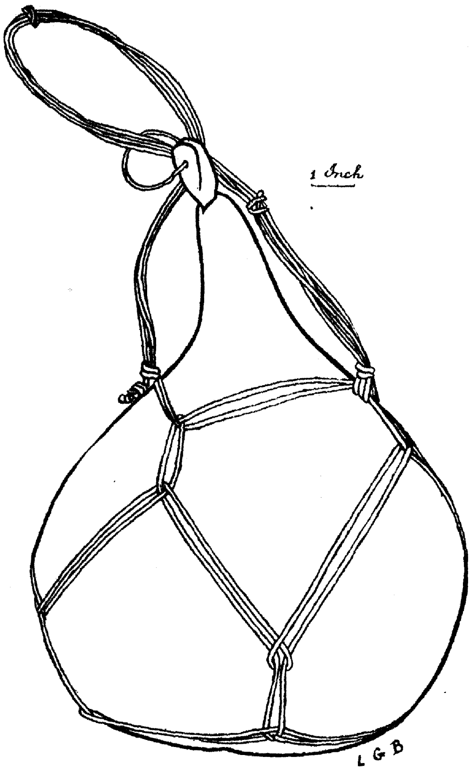


FIG. 106. HUEWAI. GOURD WATER BOTTLE.

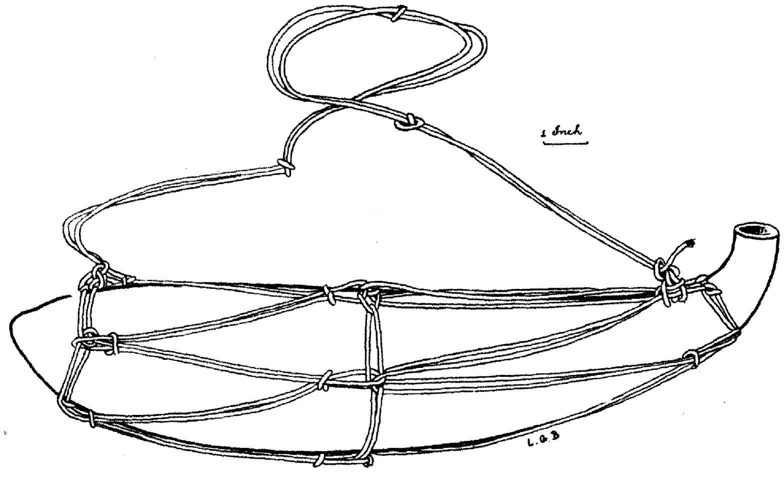


FIG. 107. OLOWAI. GOURD WATER BOTTLE FOR CANOE.

PIKO A (Figs. 110 and 111).—A piece of cord is first knotted into a ring with the loose ends closely severed. In the first figure, at the point *b* the shuttle is passed over and under the ring, over the free end of the cord *a*, under and over the ring and back through the loop along *a*. At *c* a simple knot is tied on *a* and the half hitches at *b* are repeated at *b′* leaving a loop at *d*. The loops (from 6 to 12) are formed in this manner and completed by the return cord *e* making a knot with *a* at *f*. The work from this point is part of the hanai.

This is Piko A in its simplest form, and in the second figure a variation is shown where the shuttle cord, after tying at *b*, makes a different knot with *a* at *c*, the details of which are shown at *c*′. All the knots at *c* are tied similarly to *c*′, and at *c*″ the order of tying is merely reversed. The return cord *e* knots with *a* at *f* as shown.

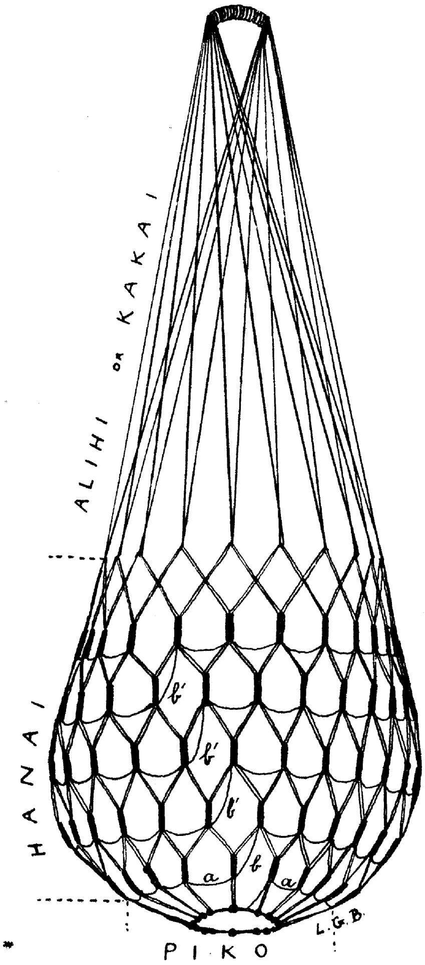


FIG. 108. KOKO PUUPUU.

Piko B (Fig. 112) is as in Piko A as far as *c* where the shuttle cord is knotted simply, thus leaving a loop, through which the loop *d* is passed. Then the shuttle is run twice round the loop *c*, and back through the two loops thus made. This knot is the same as a fisherman's knot with a double turn. Piko B differs from the former in that an additional loop *d* is added to each knotted loop *c*.

Piko C (Fig. 114).—A simpler form than the following piko. In this the cord is twice looped, and the free end *b* passed under the shuttle cord *a* and around *a* and *c*. The loop *d* is left and the free end knotted around the base of the loop, thus fastening the ring. The shuttle is then sent around the ring at *f*, when the process of the first knot at *e* is repeated reversed.

Piko D (Fig. 116).—A double ring being made, the free end is passed over the shuttle cord, under the other ring cord and back over the shuttle cord, following which a half hitch is made around the ring and the knot at *b* completed, Diag. 1. Then, Diag. 2, three loops are made through the ring at *d*, the shuttle returning at *e* and being sent around the loops and cord *a* three times and through the loops thus formed. The knot at *h*, Diag. 3, is thus made, and the cord *f* carried to the next point *g* on the ring, where the last described knot is repeated.

Piko E (Figs. 117 and 118).—In the samples examined, a double ring was made, with the free end *a*, Diag. 1, Fig. 117, passing under the shuttle cord *d* and over the middle cord *b*. Then, Diag. 2, *a* is looped, passed through the ring at *b* and knotted simply to itself at *c*′, looped again and a fisherman's knot with two turns run around the part of the ring at *b*. This process results in the knot at *h*, Fig. 118. Then the shuttle cord *d*, after tying at *c*″, continues, as *ff*, the work of the piko, which is complete when *f* joins the free end at *i* and begins the hanai as *f*′. This piko in principle is the same as the previous two, but the compression of the ring at the four points gives a very different effect.

The five foregoing piko were all made with the shuttle and attached to netted hanai. They were, too, more often used in the koko pualu than in the koko puupuu.

Piko F (Figs. 119 to 122) was found to be the most common in the koko puupuu, and this and the following styles were made from cord on a ball, not a shuttle, and were attached to the knitted hanai. Four methods of forming the ring in this piko are illustrated in Fig. 119. Diagram 1 shows the end cord *a* looped and tied with the ball cord, forming *b*. Then the ball cord is looped at *g*, passed under *b* at *c* and through the loop *g* at *d;* or, a half hitch is formed and slipped over *b*, following which the ball is passed around *b* at *e*, the loop *f* passed through *e d* and the ball carried round *b* to the next point. In Diagram 2 the cord is bent at *b* and the ball cord carried round the end cord *a* at *c* and the loop *f* made as before. In the next diagram, a slip knot is tied to the end cord *a* at *d*, whence the loops *f*, etc., are formed as usual. The loops of the piko in these three diagrams continue along *b* until the piko is of the requisite size, when the end cord *a* is passed through the end of the loop *b*, knotted or twisted and concealed, as also in Diagram 4, in the first knot of the hanai. In Diagram 4 a double ring is made and the ball cord wound once around the end cord *a* at *b*, and the loop *f* proceeded with as before; the cord *a* is left free to enlarge or decrease the ring during the work. The appearance of Piko F is shown, obverse side in Fig. 120, and reverse side in Fig. 121. In this piko and some of those following, the end cord *a* after being attached to *b* is sometimes wound around the bases of the outer loops *f* once or twice for ornamental effect. Fig. 122 shows Piko F with the end cord run twice around the loops.

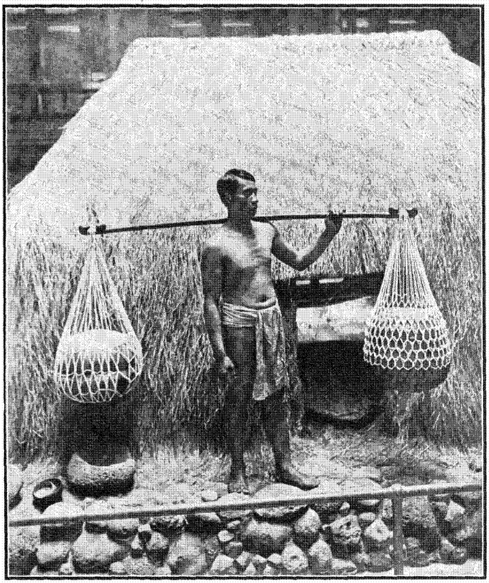


FIG. 109. NATIVE WITH AUAMO OR BEARING STICK.

PIKO G (Fig. 123) is shown with a quadrupled cord forming the ring. After doubling the cord twice, the ball cord is tied with a simple knot around *c* and *a* at *e*, and leaving a loop at *f*, two half hitches are run around or slipped over *b* and *d* as shown at *g*, *h* and *j*. In the specimen figured the ring was joined by passing *b* and *d* through *c* and tying *a* to the latter. Then the loops *b* and *d* together were used for the first knot of the hanai.

PIKO H (Fig. 124).—After being looped at *b* and tied at *c*, two half hitches are taken around the base of *b* leaving a loop at *d*. Then the ball cord is passed behind and around *b* (see *f*) and the loop *g* slipped through the loop thus made. At *h*, the last loop of the piko, an additional half hitch is slipped over *b* after the loop has been made.

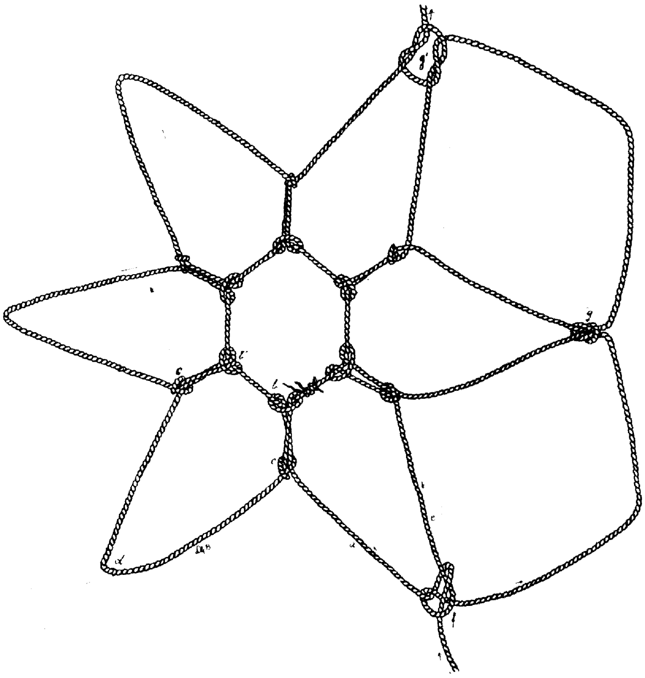


FIG. 110. PIKO A, HANAI C.

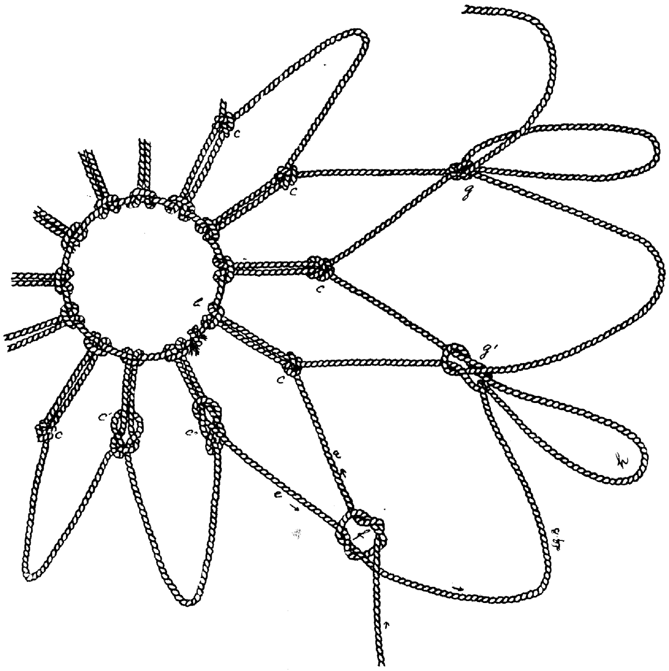


FIG. 111. PIKO A, HANAI C.

PIKO J (Figs. 125 and 126) is simpler than F and one step further on than H. In the specimen taken as an example and figured, Fig. 125, the piko could have been as easily made with one piece of cord, by running *y* on as *a*, as with two. A detached cord is bent double at *z*. Then the ball cord is passed around *x* and *y* and over the free end *a*, to begin the work, and back under *x* and *y*. Following this a loop is made (see *d*), twisted round and slipped through the loop *b* thus left, and the work continued with the ball cord *e*. In the example figured, the ring was joined by passing *x* through *z* and tying with *y*, when *x* and *y* were concealed in the first hanai knot. Fig. 126 has the end cord wound once around the base of the loops as referred to in the paragraph on Piko F.

PIKO K (Fig. 127).—This is similar in construction to the last, but with the outer loops far apart, and the spaces on the ring between wound with the ball cord. In Diagram 1 the cord has been doubled, leaving a loop at *b*. Then the ball cord is looped at *c* and at *d*, the latter being passed around *a* and through *c*, and drawn taut. The ball cord is tightly wound around the bend of *b* for several turns and two loops formed, the second being passed under *b* and through the first. Diagram 2 shows the method of fastening the ring, which being done, the ball cord *e* and end cord *a* are combined to make the first knot of the hanai. This piko consists of from fifteen to thirty loops, and is generally very large in diameter.

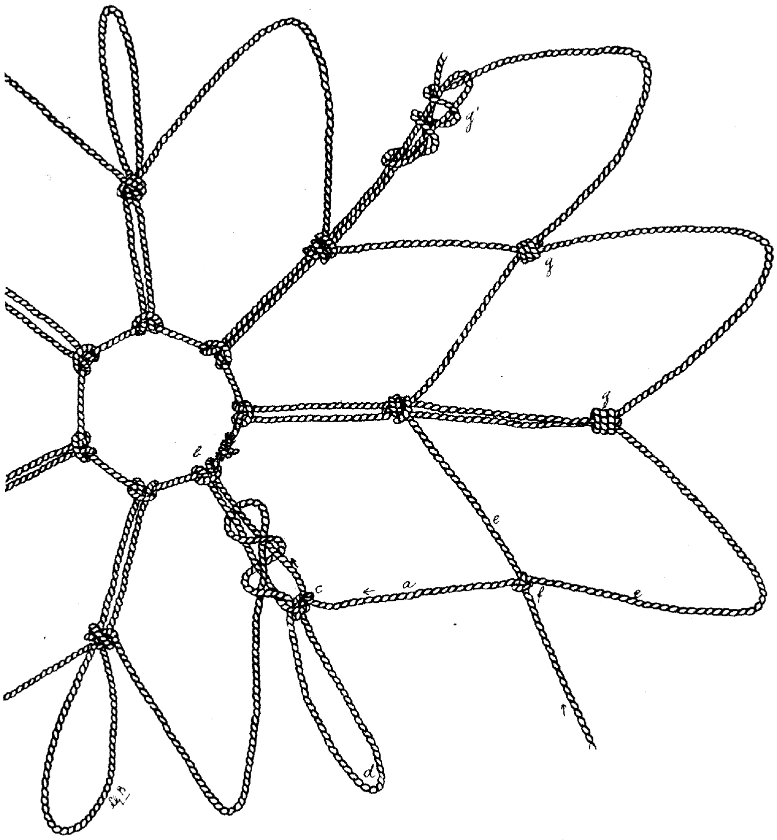


FIG. 112. PIKO B, HANAI B.

PIKO L (Fig. 128).—A triple ring is made by doubling the end cord at *b* over the ball cord *a* and running the former twice around, Diag. 1. Then the end cord *c* is wound round *b* once and the cords of the ring for about one-quarter its circumference, and is passed back and forth through the ring to form the loops *o o*, Diag. 2; after the last turn *e* this cord is wound four times around the bases of *o o*, Diag. 3, passed through the windings *m* and around the cords of the ring at *f* and the winding on the ring continued at *g*. It is probable that the piko in the specimen examined was made with a shuttle or a small ball of cord in addition to the large ball, for the amount of this end cord is considerable. Then the ball cord *a* is looped three times, the bends being doubled over *b* (making six loops at *p p*) and bound with four half hitches by *a* to make the knot at *k*. The base of one of the loops of *p* is pulled out at *l*, the ball passed through the bight and *l* closed by drawing on *p p*. The end cord *h* returning from the circuit is then bound over *k* with half hitches and concealed in the hanai which the ball cord *a* commences with one of the loops of *p*.

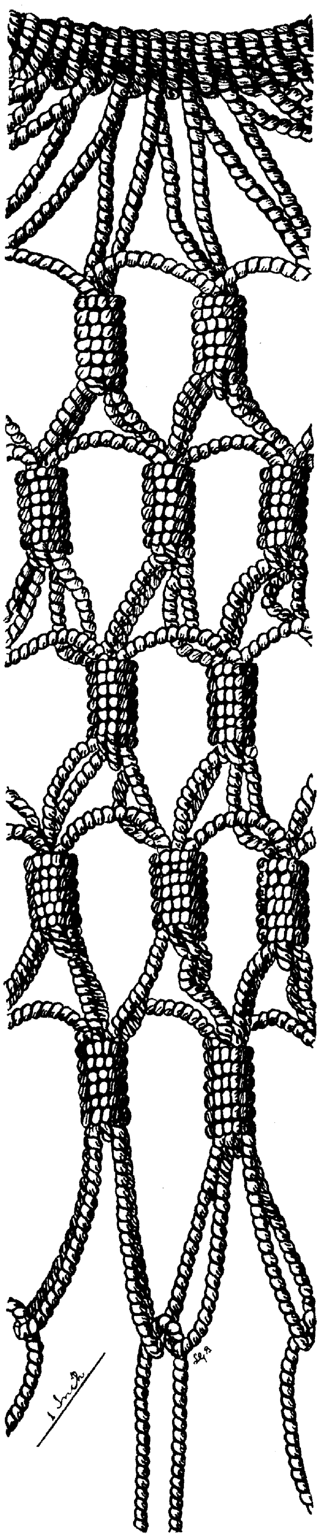


FIG. 113. HANAI D.

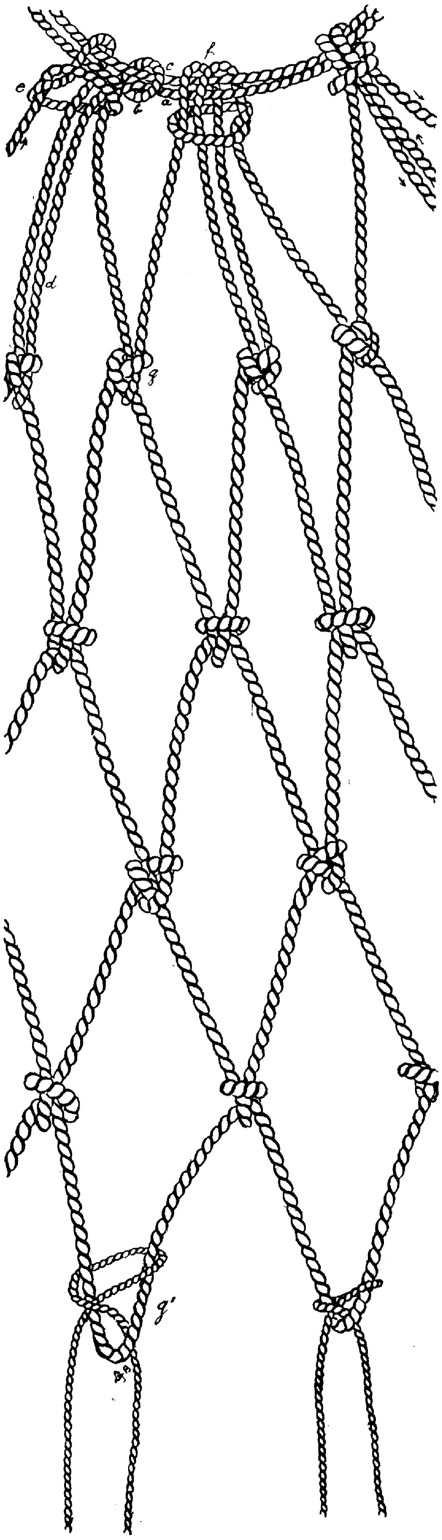


FIG. 114. PIKO C, HANAI A.

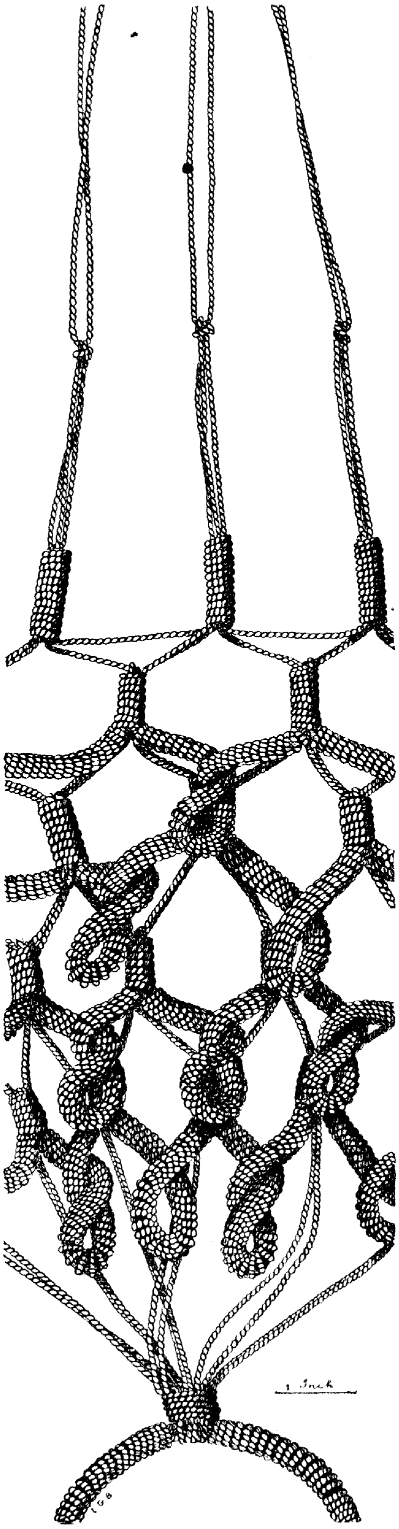


FIG. 115. HANAI F.

PIKO M (Fig. 129).—With the end cord *a* the slip knot *a b c* is made. Then a loop *d* of the ball cord is slipped through *c* and the ball passed once around the base of *c* at *e* leaving a loop at *f*. Through *f* another loop *g* is passed, the ball cord returning at *j*, with which *h* is made similarly to *d*. The appearance of the piko completed is given from *j* to *k*, and strongly suggests crochet.

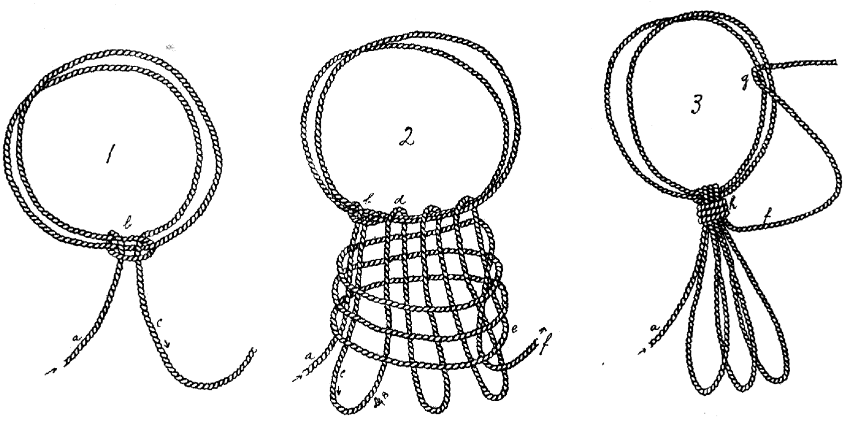
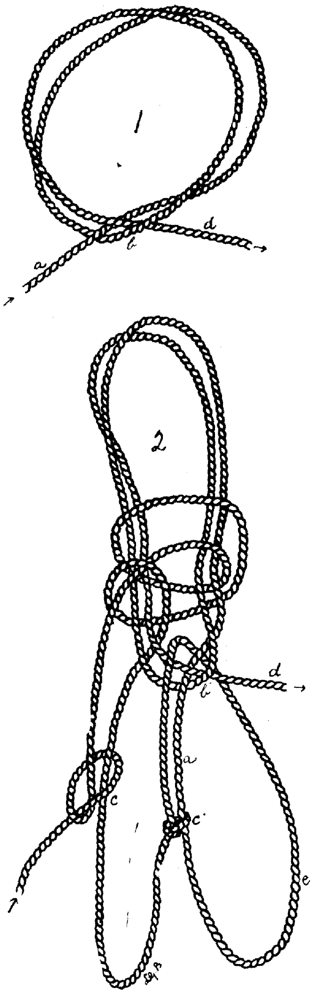


FIG. 116. PIKO D.



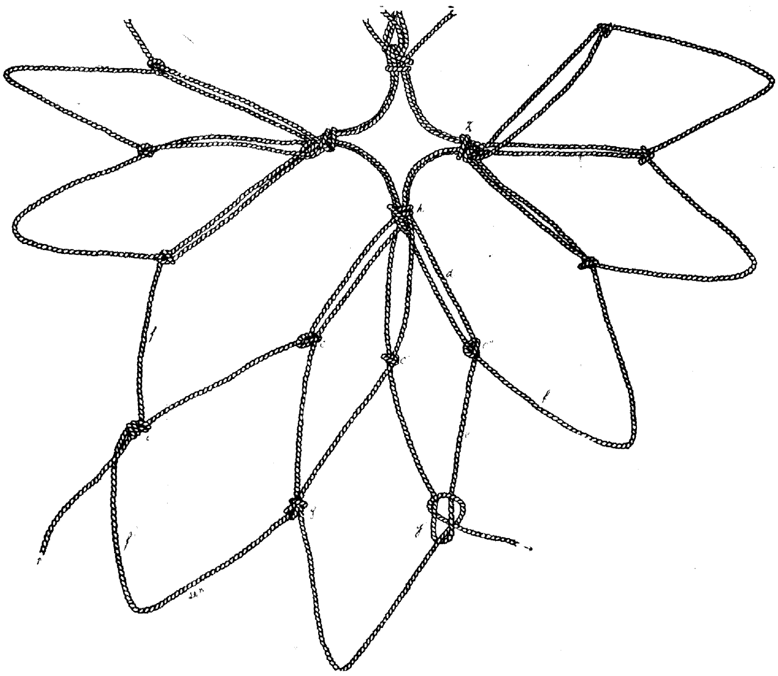


FIG. 118. PIKO E, HANAI A.

FIG. 117. PIKO E.

PIKO N (Figs. 130 and 131).—Now, if in Piko M, the cord *e* were wound around *c* twice or more, it would represent Piko N. To commence this piko, a slip knot is made, *b c d*, and the ball cord *f* wound round the end cord *a* at *e* from two to ten times as wanted; then a loop *g* of the ball cord is pushed through the windings, returning at *j*. This knot can be and probably was made in a simpler way. With the ball cord *j* looped through *g* at *h*, the loop *l* is made leaving a large slack at *m* and *n*; then this slack is tightly wound around *g* and *l* the required number of times, the balance of the slack being taken in by drawing on *l*. Reference should be made to the knot in Hanai D in Fig. 137.

Piko O (Figs. 132 and 133).—In Diagram 1, after doubling the cord at *g* make the loops *b*, *d* and *f* with the ball cord, leaving enough slack. Then lay the ball cord *e* along the bends of the loops and wind the slack *c* a few times around the whole. Then loop the cord *a g* at *h* and continue winding with *c*. When the slack of *c* is taken up by *e*, the knot *x*, Diag. 2, will serve to begin the piko, and the details of the regular knot are shown in the same diagram. *X* being completed, with the ball cord *e* pass the loop *b′* through *d* leaving slack at *h′*, and over *b′* lay *e′* and the loop *d′*, leaving another slack at *c′*. Then *c′* is bound around all the cords on a level with *d*, and as the binding proceeds, the slack *h′* is divided into two loops, *h′ h′*, Diag. 3, and held in place by *c′*. Sometimes the ball cord *e′* is not laid along *d′*, but is carried forward outside *y*. In such cases this piko differs from Piko N only in the additional loops *h h′* projecting from the side. Fig. 132 was drawn with the details in an upright position. Fig. 133 shows this piko, which in the specimen photographed was small.

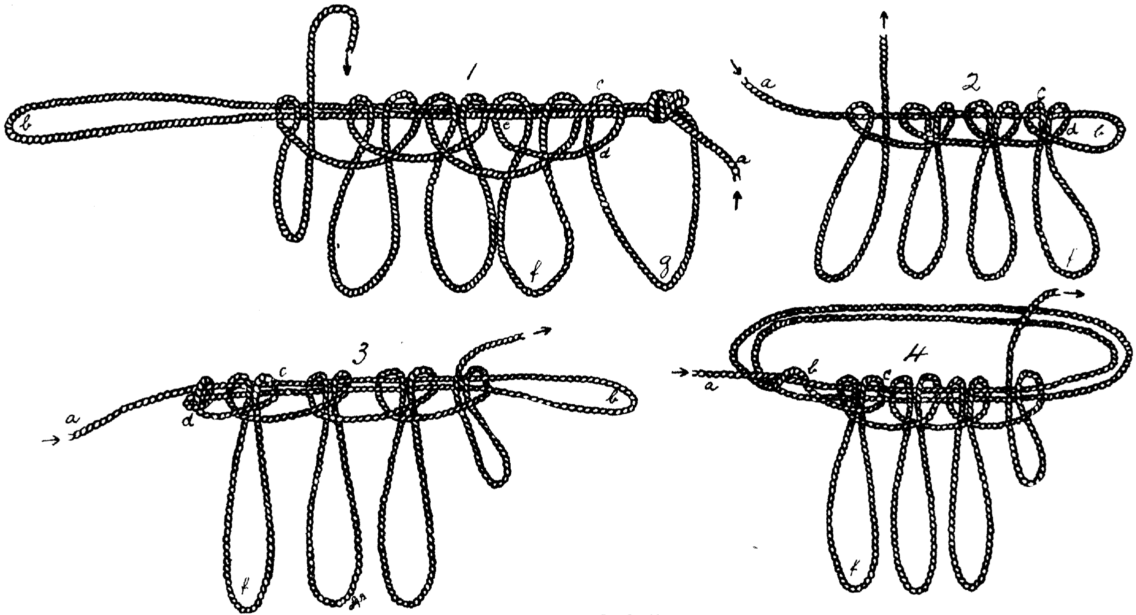


FIG. 119. PIKO F.

Hanai.—The hanai begins where the last loop of the piko was made.

Hanai A (Figs. 114 and 118).—This is the simple fisherman's knot, known by natives as *ka*, *umii*, etc., as shown by *g g′* in the figures.

Hanai B (Fig. 112) is the fisherman's knot with one or more extra windings around the engaged loop, as at *g* and *g′*.

In some of the koko puupuu the knots of both Hanai A and B are used as in Fig. 134. Fig. 135 is a specimen of koko puupuu with Hanai B.

Hanai C (Figs. 110, 111 and 136).—This is the square or reef knot, *makili*, *gg′*, Fig. 110. Sometimes in beginning a large hanai, additional loops *h*, Fig. 111, were run on to the loops of the piko for the purpose of enlarging the periphery of the hanai.

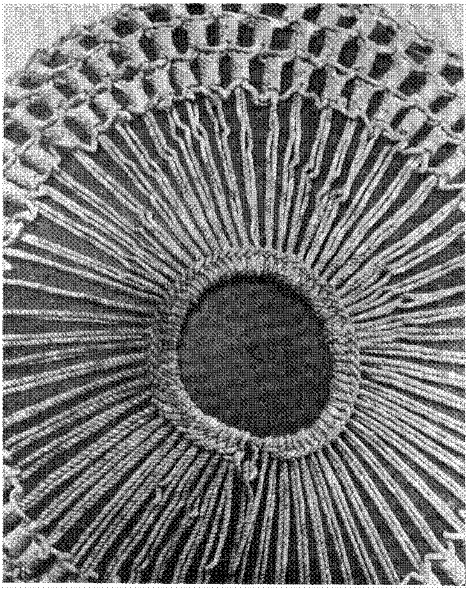


FIG. 120. PIKO F, OBVERSE.

Fig. 136 shows the specimen from which Piko D, Fig. 116, was illustrated. This was a particularly well made and finished netting used as an *eke*. On completion of the piko the shuttle cord *k* was looped at *n* (without tying to the free end *a*) and knotted to the piko loop *p* and so carried round the circuit to *l*. The cord *l* was then looped and the rows of the hanai completed, the work travelling boustrophedon. To join the ends of the rows, the shuttle cord *m* is brought back from the outer edge of the hanai by knotting from side to side until tied with *a* to *k* at *r*.

The three foregoing styles represent the netted hanai, which have the ends of the rows joined in the manner just described, or else by the free end *a* netted from side to side towards the outer edge.

Hanai D (Figs. 137, 113 and 133).—The principle of this, the basal knot of all the knitted koko, has already been partially illustrated in Piko M, N and O, but since it is so generally used, fuller details of its technique in the hanai are given in Fig. 137. The loops *xx* are those of the piko, and *f* is the completed knot of Hanai D, known to the natives as *puu*. In Diagram 1, the ball cord *a* is looped *b* through the next piko loop, and, Diagrams 2 and 3, the slack *c* being left, the loop *d* is bent and placed under *b*. Then *c* is wound round *b*, *d* and the bight of *x* and the slack taken up by *d* and *e*. In knitting the succeeding row of the hanai, the nearest loops of adjacent puu of the first row are placed together and bound by the outer knots. Sometimes when the mesh of the hanai is intended to be large, two loops of the piko are combined in one puu. And occasionally, but only with the closely knitted koko of coir, the hanai commences with but few puu near the piko, Fig. 133, and the number is doubled by using each loop of the puu of the inner row as a base for that in the outer. In the figure the number of puu in the second, third and sixth rows have been successively doubled.

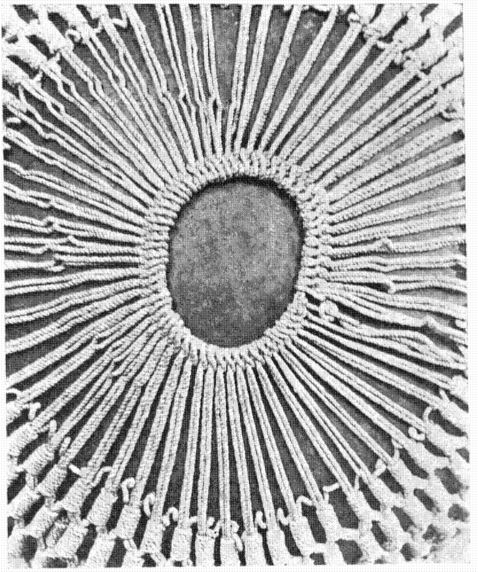


FIG. 121. PIKO F, REVERSE.

The work of the knitted koko was directed either continually to the right, or to the left, or had the alternating rows in each direction; there seems to have been no set rule, but one circuit was always completed before the next began, in which respect it differed from that in the netting. The knitted knot can at once be detected by the cord hanging from and connecting the bases of each puu (see *a* in Figs. 108 and 137). When one row was finished, the ball cord *b*, *b′*, Fig. 108, was carried up with the loop of the last knot to begin the row above.

HANAI E (Figs. 138, 104 *a*, and 105 *a*).—This is the same as Hanai D, except that the outer loops are interlaced before the ends are bound together with the puu.

HANAI F (Figs. 139 and 115).—Before completing the puu, the ball cord *e*, Fig. 139, is looped *g* through the slack *c*, which is taken in as usual. Then round the bends of *g* the ball cord *h* is very tightly wound, finishing at *k*, Diagram 2. Then the bight of *g* is placed on that of *x* and the loop *l* on the ball cord run through *x* and *g*, after which the puu is repeated. A koko of this style, unique in the collection, is illustrated in Fig. 115 in its suspended position.

Hanai G (Figs. 140, 141, 131 and 105 *c*).—This hanai, in addition to the puu of Hanai D, has from one to three knobs constructed like the puu, attached to the base. Fig. 105 c, shows this hanai in inverted position with one knob attached, and Fig. 131 the same style with the three knobs, in which case the name of the koko was koko puupuu *huihui*. Following the completion of the puu, Fig. 140, the ball cord *e* is looped *g* around the connecting cord *a* and the puu repeated (*o*, Diag. 3) the loops *g* and *j* being drawn flush with the wound cord. This is followed by a similar puu, *p* and *r*, on the bends of *x*. Diagram 4 shows the under side of the huihui. In Fig. 141 the puu *o*, *p* and *r* are all made around *x* and *a*. It has been observed that if the mesh of the koko is small, the rows of knots alternate with the styles of Hanai D and G.

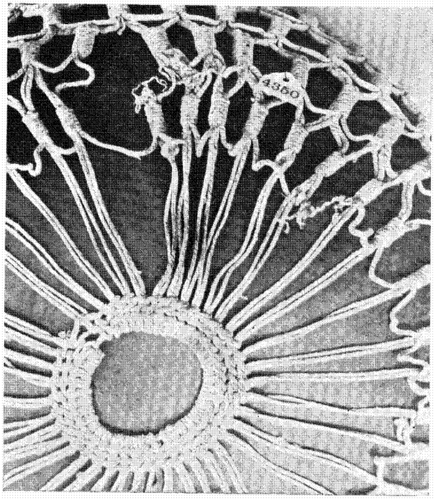


FIG. 122. PIKO F.

Hanai H (Figs. 142 to 144).—This hanai has from one to three puu looped around the puu of Hanai D. The method is similar to that in Figs. 140 and 141, but the loop *j* is allowed to project slightly from the puu *o*. In Fig. 142, the puu *p* is attached to the base of *o* and the loop *n* allowed to protrude. Then *n* is passed through *j*, slipped over *b* and *d* and drawn tightly around the base of *b* and *d* by the ball cord *m*. Fig. 143 shows a koko with the piko half of the hanai, coir and style D, and the kakai half, waoke and variations of Hanai H. In Fig. 144 is given an illustration of the outer rows of a koko in suspended position, the body of which is of Hanai H as shown in the lower knots, and the upper edge of Hanai J.

Hanai J (Figs. 144 and 145).—It is probable that koko exist which are made entirely like the upper row of that in Fig. 144, though there are none in the Museum. In Fig. 145, Diag. 1, after the puu *f* is complete, the ball cord is looped, *g*, and passed around *x* and *a*, and a series of half hitches are slipped over *g*. As the half hitches approach the loops *b* and *d*, the latter are each included in a half hitch in turn. Diagram 3 shows the reverse side. When attaching the bight of *g*, Diag. 2, the ball cord is looped at *j* leaving a slack at *l*, the loops *g* and *j* bound together by one turn and the binding continued around the whole as with the puu.

HANAI K (Figs. 146 and 105 *d*).—This follows J as far as the loop *h*, which does not encircle *x* and *a* (Diag. 1, Fig. 146). Then two half hitches are slipped over *g* and drawn tight, a loop left and two more half hitches added. Diagrams 1 and 2 were drawn from the reverse side, and Diagram 3 from the obverse. As *g* passes between *b* and *d*, one of the loops on *g* is run around *d*. To complete the knot, *h* is laid on *x*, and *g* and another loop *j* added, when the whole is bound together in the usual way with the slack *l*. In this hanai (see Fig. 105 *d*, with the koko inverted), the knots in the succeeding row are placed directly in front of those of the previous one, while the loops *b* and *d* of one puu are not separated as in all the other hanai.

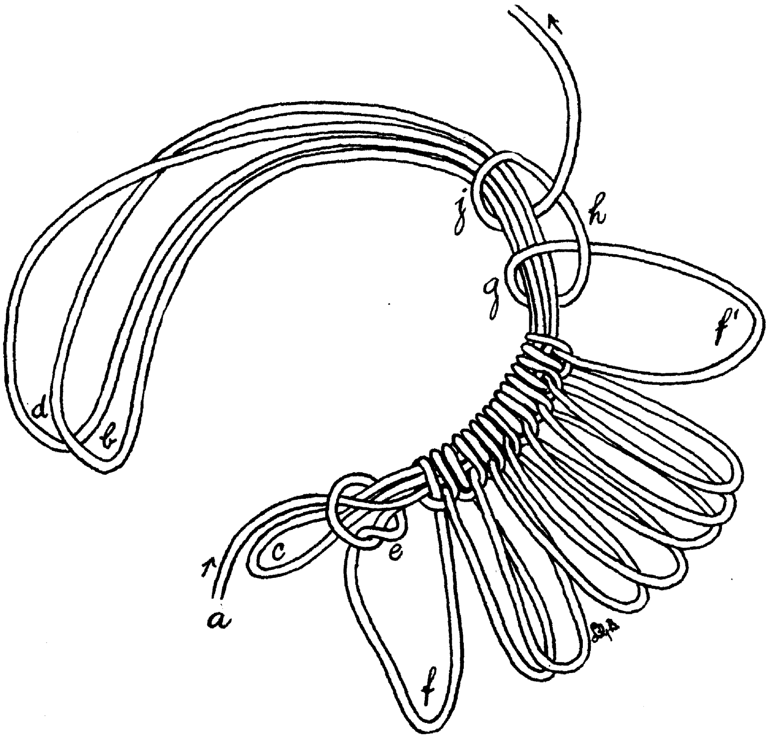


FIG. 123. PIKO G.

HANAI L (Fig. 147).—This hanai shown in the figure in suspended position was constructed so as to leave four circular spaces reaching from top to bottom. The pillars of the body were made with the puu of Hanai D very closely knitted and the ends of the rows finished with the puu of Hanai G. Each pillar was completed before the next was begun. The rows are fourteen puu wide at the piko, decreasing to three at the middle and increasing to thirteen at the outer edge. As the work proceeded, the ends of the rows were embroidered with two additional puu as in Hanai G on one side and one puu on the other, and a row of such puu was attached to the connecting cords of the last row on the pillar. The cord is then at the outer edge of the hanai and is brought to the piko by intertwining with the puu on the side of the pillar last mentioned, and an additional puu knitted to the end of each row. The last pillar being made, a row of simple puu is run around connecting the outer edges of the hanai.

HANAI M (Fig. 148).—This is really an elaborate form of piko finished with a single undulating row of puu. The koko is shown in Fig. 148 in an inverted position, and is unique in the collection. When suspended, it has the appearance of an arcade with the flooring angularly channelled. The first step in making this koko was the construction of an arch in the same manner as Piko F, the loops on the pillars being very short and on the arch of various lengths. Inside the arc, to stiffen it, was placed a piece of coir. The six arches complete (probably in separate pieces), the pillars were joined by running fine double cords alternately through the small loops of the opposing sides. Then a row of twelve long puu was attached, one puu to the base of each of the original pillars, and joined together in pairs by a row of six short puu. The basal cords, the arches and pillars having been included in the long and short puu, were incorporated with other loose ends in a piko roughly made after the style of Piko N. To the outer edge was added a row of Hanai D, which made it ready for the kakai.

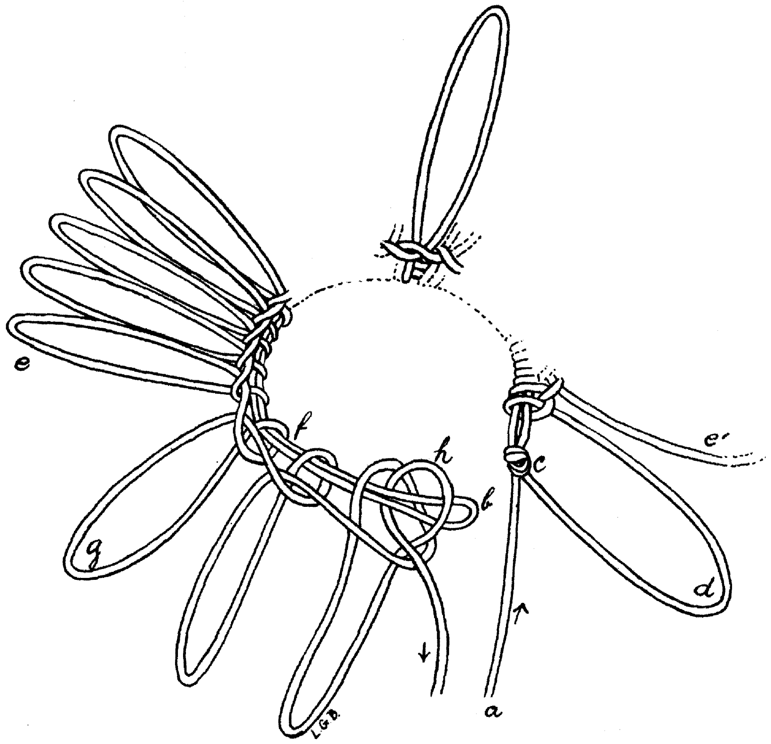


FIG. 124. PIKO H.

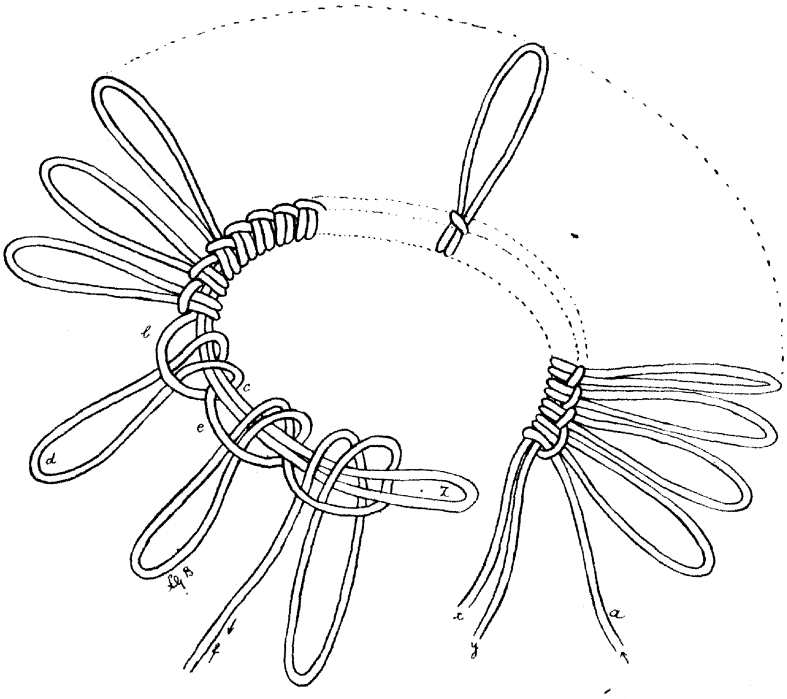


FIG. 125. PIKO J.

Kakai.—The strings of the kakai were gathered together at the pu by two methods. In all the better class koko and many of those used by the common people, the pu was evenly and smoothly wound with the end of the cord, which winding was termed *uo*, Fig. 153. With the pu uo, the kakai was as a rule divided into two series of strings, and was rarely gathered together as one pu; this latter condition most frequently occurred with the commoners' koko, when the pu was composed of half hitches, termed *lino*. It was somewhat awkward to take out the umeke from a koko with a single pu, the only opening being between the strings of the kakai, but all the koko of this kind were of coir and most of them around the large bowl-shaped gourds for transporting water, so it is quite probable that it was not intended to remove them often. In length the kakai was about equal to the hanai and piko combined, inclining if anything to be slightly shorter.

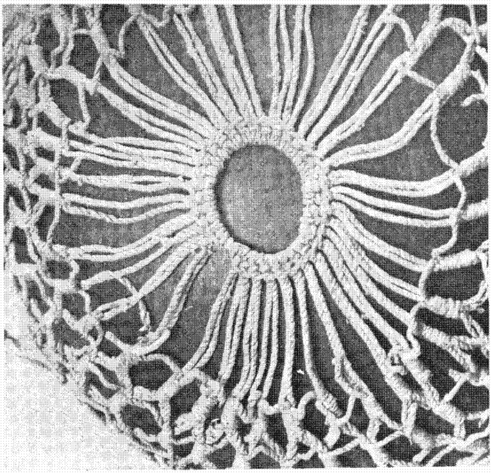


FIG. 126. PIKO J.

There is a remarkable form of netted bag in the Museum, No. 4454, Fig. 149, the material and workmanship of which is not recognized as Hawaiian by any native who has seen it. It was in the late Hawaiian Government Museum, and came to the Bishop Museum as a Hawaiian koko with the rest of the collection, but the curator of the former institution can give no information, and consequently none of its history is available. However, an old native claims to have seen some such nets in the time of Kamehameha V (1863-1872), when they were considered foreign. The material has the appearance of jute, dyed an indistinct blue-green on the surface, but there are sure signs that the cord was not made by machinery. It differs from the Hawaiian koko in having been made from a number of cords, and these cords diverge from a piko filled in with matted string suggestive of the plaiting in straw hats (*a*, Fig. 149). Another point of difference is the four separated handles in which the cords of the hanai are incorporated, each handle (*b*) being a square braid of twelve strands. The technique, Fig. 150, is the same as observed in the simpler portions of macramé work, and also the netting or basket of fern stems around certain Japanese flower vases. Another bag, No. 4455, is made in the shape of a koko with the hanai of black wool netted as in Fig. 150, and a kakai of heavy cord similar to that in No. 4454.

The koko were divided into two classes by the Hawaiians: the koko puupuu, the property of the chiefly class, *alii*, and the koko pualu, used by the *makaainana* or plebeians. Mechanically there was no difference between the koko pualu and some of the koko puupuu, but those of the chiefs were always recognized as being better made, more elaborate and of superior cord.

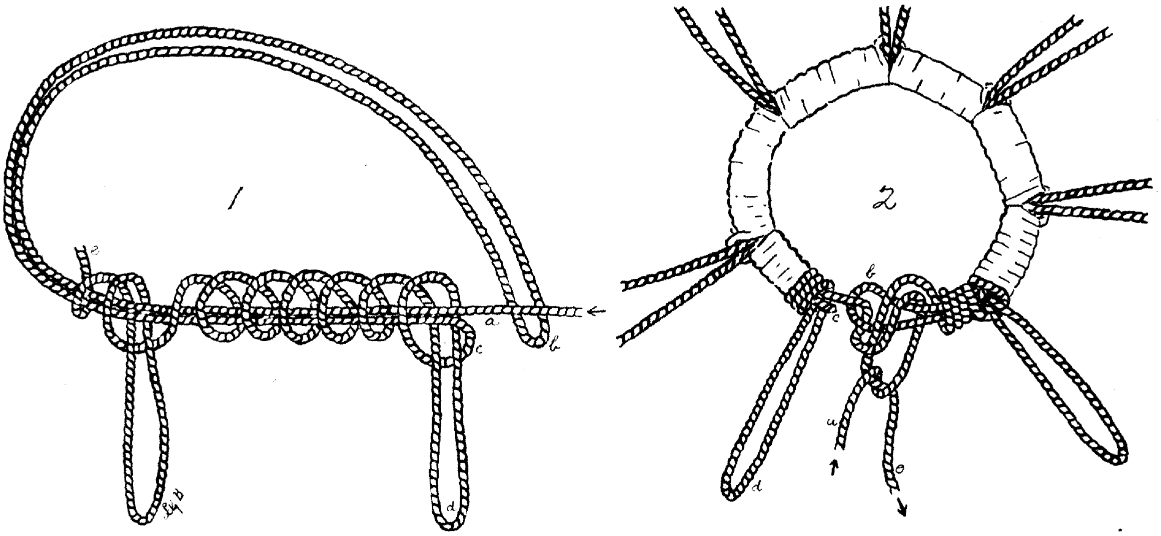


FIG. 127. PIKO K.

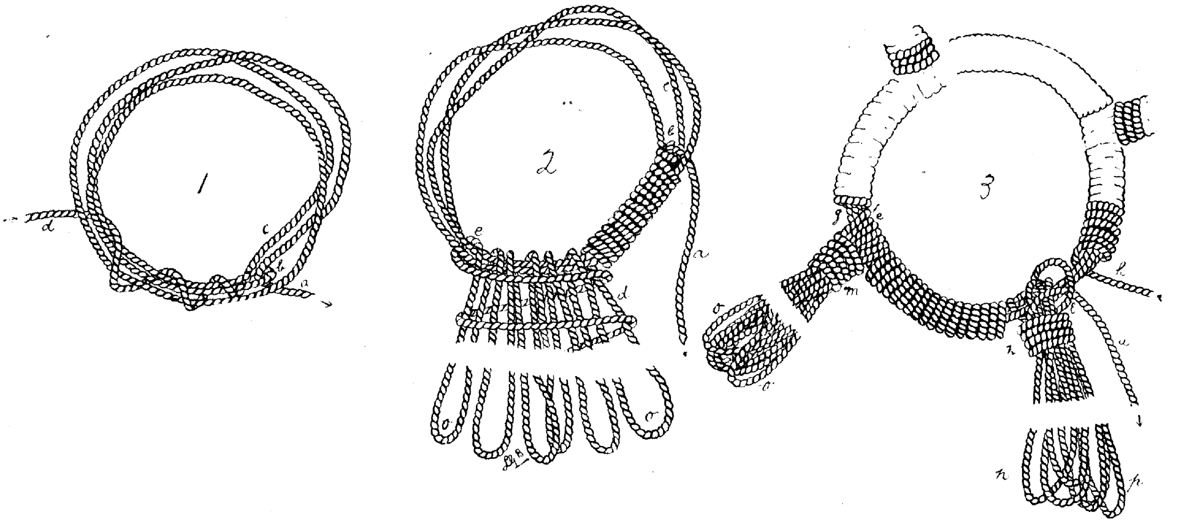


FIG. 128. PIKO L.

Koko Pualu.—The koko pualu was a plain netted bag, made of coir, hau or ahuawa, Figs. 104 *b*, 114. The term pualu was little used to designate this class. The material most generally employed in making the koko pualu was coir, and a coir koko of the class pualu would be referred to merely as *koko*. To one made of ahuawa the name koko ahuawa was applied, while the chiefs' koko were never known otherwise than koko puupuu. The knots used in the structure of the koko pualu were the ka, and more rarely the makili. The mesh was always large and plain.

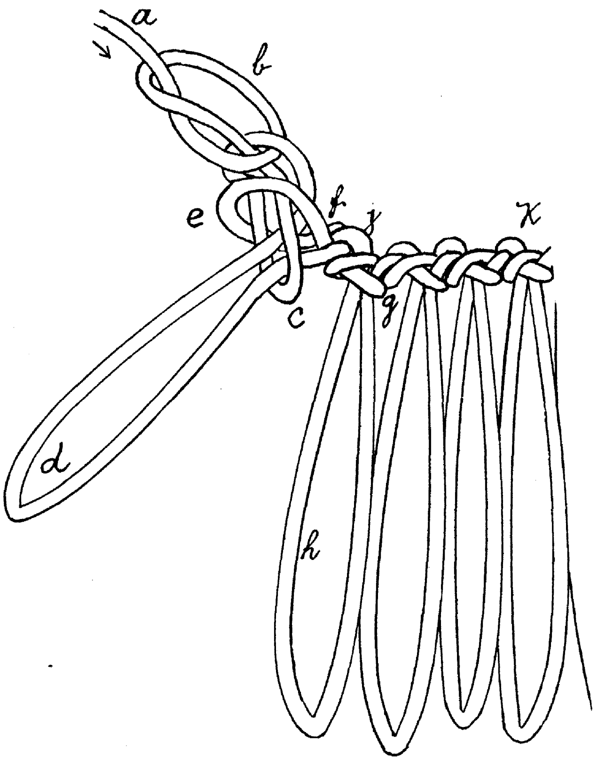


FIG. 129. PIKO M.

A variation of this form with a smaller mesh was employed to carry such articles as sweet potatoes, taro, etc., without the aid of an umeke. It was made with a piko and hanai as in the koko pualu, but instead of the kakai as shown in Fig. 108, a cord was run through the outer selvage of the bag, thus serving to close the opening and act as a handle. This implement was known as an eke or *laulau*.

Koko Puupuu.—The koko puupuu was reserved for the sole use or service of the alii, who were exceedingly jealous of their dignity, promptly punishing by death any presumption on the part of a plebeian in making personal use of such a koko. One reason for which a makaainana might carry the koko puupuu for his own needs, was protection against robbery by the kahu of some alii for his master. A commoner carrying food in a koko pualu was always liable to have it appropriated by any one of higher rank than himself, since the koko pualu indicated that it was only the belonging of a makaainana; but the subterfuge of utilizing a koko puupuu, implying that the carrier was in the service of a chief, would protect the property unless the man were found out, when the consequences to himself would be

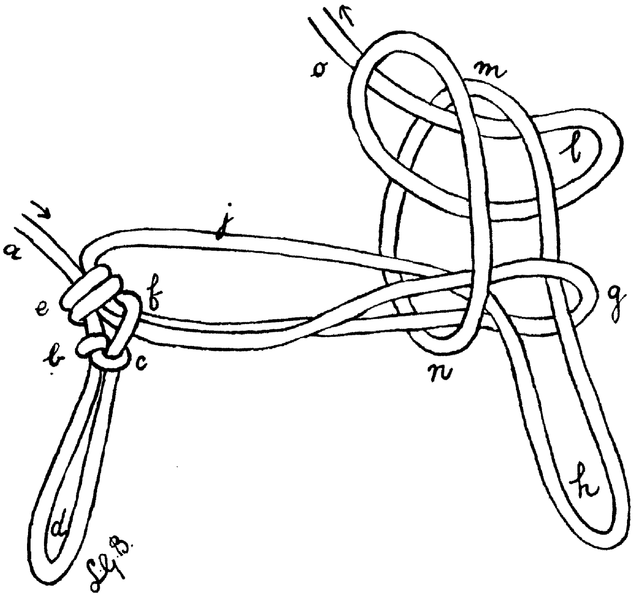


FIG. 130. PIKO N.

very disastrous. This koko took its name from *aipuupuu*,[38]—the steward of a person of high rank, deputed to carry and care for the alii's food. The modern native gives the meaning of puupuu[39] in this connection as a complicated or thick knot, of which this koko is generally formed, but since some of the koko puupuu are of simple netting, Fig. 134, though of very fine mesh, it would seem that the derivation of the name came through the word aipuupuu, the explanation of which was contributed by a very old native fisherman.

The material in the koko puupuu is mainly waoke, but coir, oloná, and in later days horsehair, were also used. Frequently the piko and lower part of hanai are of coir, and the upper part and kakai of waoke, rarely oloná, Fig. 104 *c* and *d*, and 105 *b*, known as *pauku*. Occasionally two or more materials, generally coir and waoke alternate in rows, when the koko puupuu is termed *onionio* or *paukuku*. It is quite possible that horsehair succeeded human hair, which was used very extensively in the neat braid of the *niho palaoa* and for decorating fan handles.

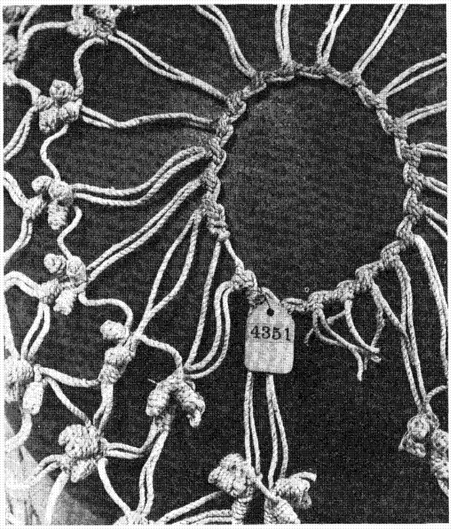


FIG. 131. PIKO N, HANAI G.

The knots in the hanai were either knitted or netted, taking for the application of the word knitted, a slip knot, or one that when formed may be undone by drawing on the last end of the cord. The knitted knot is shown in detail in Fig. 137 and following.

It might be here mentioned that enquiry among the older generation of living natives elicited almost no information concerning the manufacture and use of koko, particularly the koko puupuu, as these articles have been out of use for many years. One old man explained that he had seen his grandfather make them, but that he himself had had no use for them so did not take the trouble to learn. However, he could make good fish nets! There are a few natives in Honolulu who make koko for sale to tourists, but they unfortunately did not acquire the art by inheritance, merely having picked it up by unravelling some old specimen.

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[38] Aipuupuu = callous-necked. These men (class) were always recognized by a large callus on the shoulder, caused by the auamo, and were very proud of the mark denoting their office.

[39] Puu, puupuu, pu and pupu, in Hawaiian are very closely allied. Puupuu and puu mean, in short, "Any round protuberance belonging to a larger substance." (See Andrews' Hawaiian Dictionary.)

It was particularly desired to learn the exact process of the native knitting and the names of such styles of hanai as E, F, H–N, and failing native sources, a thorough search among old voyages was carried out, with poor results. Only two works mention the existence of the koko. Freycinet wrote of the nettings for gourd bowls:[40] "Après le repas, on pose un de ces plats sur l'ouverture de la calebasse qui contient la poé, et le tout est surmonté d'un couvercle, qui n'est aussi qu'un morceau de calebasse; le tout est enveloppé et assujetti dans un filet à larges mailles, qui sert à le suspendre." Wilkes gave several illustrations of the methods of carrying, and remarked:[41] ". . . . they [calabashes] are surrounded by a net made of fine twine or sennit of the cocoanut."

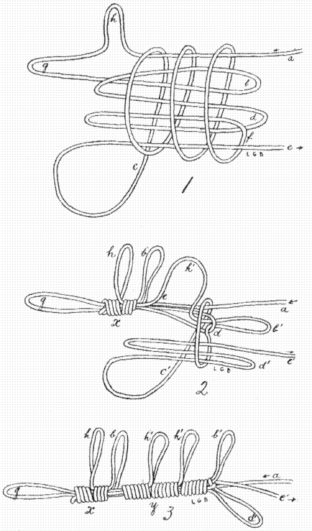

FIG. 132. PIKO O.

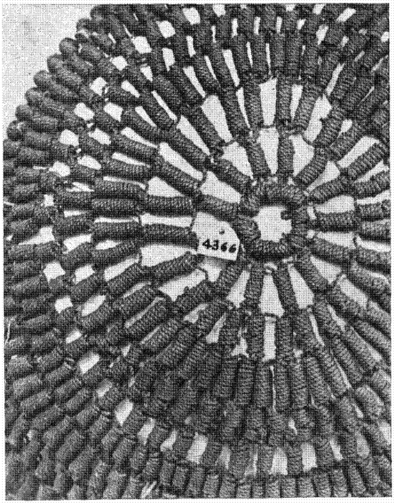

FIG. 133. PIKO O, HANAI D.

It might appear that the knitted knot, the puu, was a conception entirely Hawaiian, for none of the other members of the Polynesian race seem to have possessed such a knowledge. However, some doubt has occurred to the writer as to whether it was even native. The koko noticed in the narratives just mentioned, as a reference to the volumes will show, were koko pualu and of course netted, while some of the koko puupuu, Figs. 115, 147 and 148, were surely too remarkable to have escaped observation. All the older natives conversed with and enquired of claimed that the puu was very ancient—long antedated the advent of Captain Cook. Still, too great reliability cannot be placed on these claims when the history of the Eskimo netting needle mentioned among the tools is considered. A comparison of the puu with the knot commonly known as the hangman's knot will show that the former is but a slight modification of the latter. Foreign sailors have closely associated with the natives since 1778, and the sailor with his knowledge of knots on the one hand and the native on the other eager to learn the foreigner's ways would make it a simple matter to introduce a new method into their work. A koko puupuu of waoke in the Museum, No. 9050, and another of oloná, found in the possession of a gentleman in Honolulu, were begun in the native way with Piko F, but had the hanai made of simple knitting, Fig. 151, and finished with a row of the puu. It is known that the natives were taught plain knitting by the missionaries, who came here in 1820, and proved

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[40] Freycinet. Voyage autour du monde. Historique, Tome II, pp. 582; Atlas, pl. 86.

[41] U. S. Expl. Exped. Narrative, Vol. IV, p. 96, plate opposite p. 55, and other illustrations.

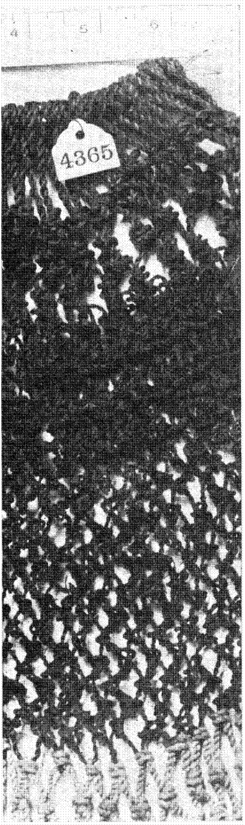

FIG. 134. HANAI A+B.

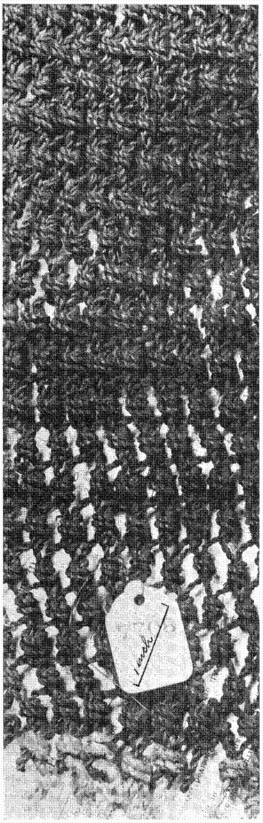

FIG. 135. HANAI B.

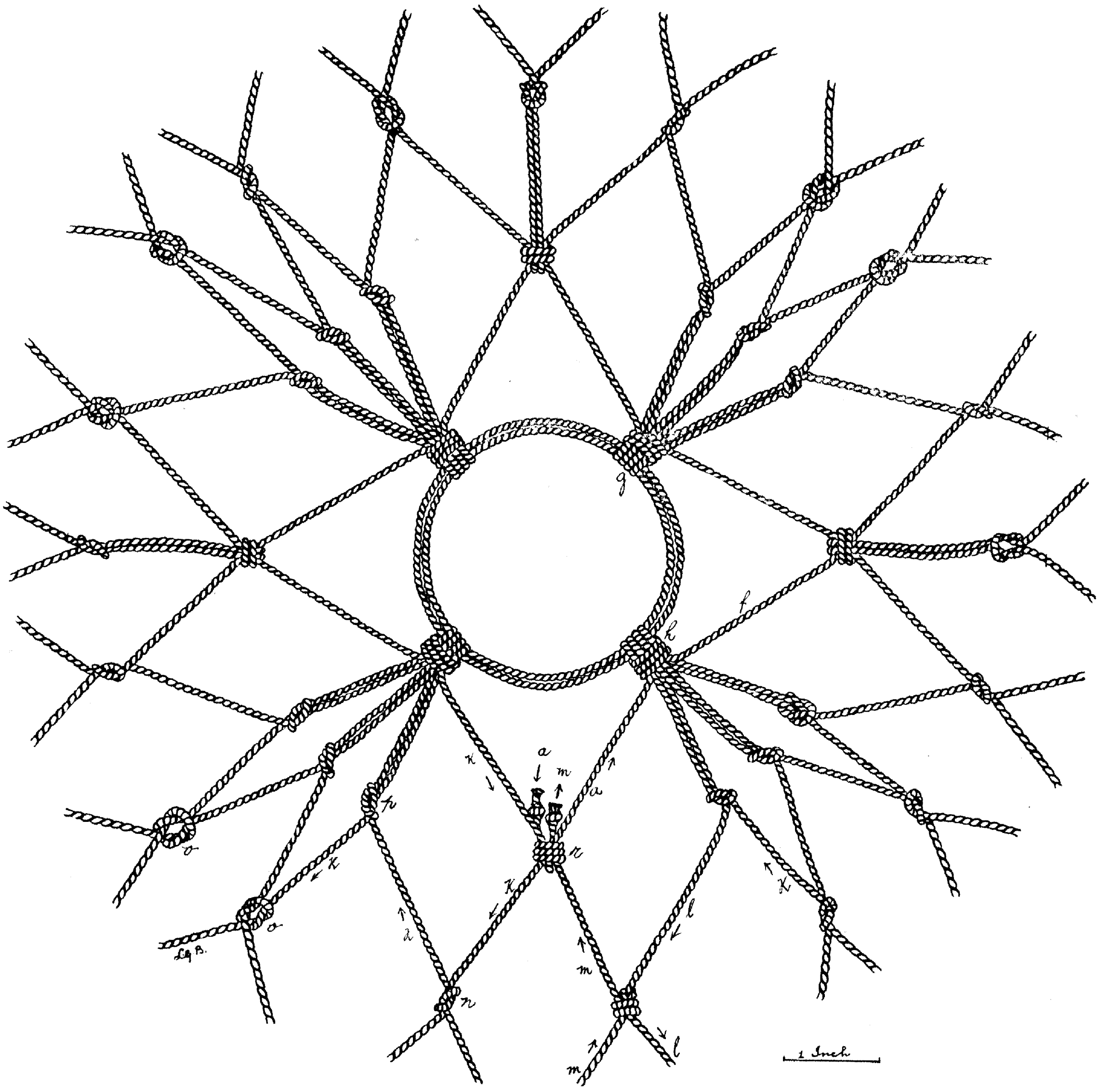
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FIG. 136. HANAI C, PIKO D.

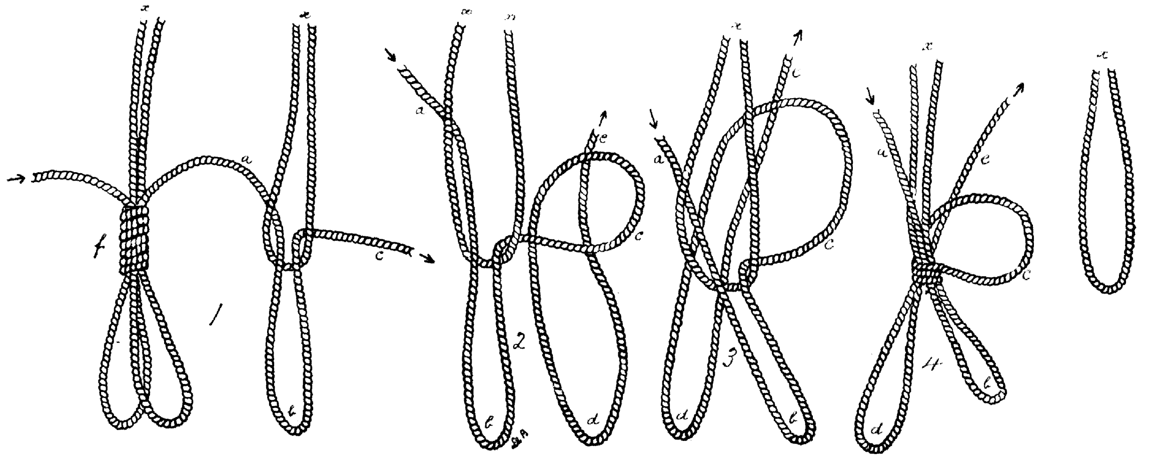
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FIG. 137. HANAI D.

apt pupils. It may be that the natives owe the knowledge of the puu to Juan Gaetano's Spaniards of about 1550, as with the shapes of their remarkable feather helmets.

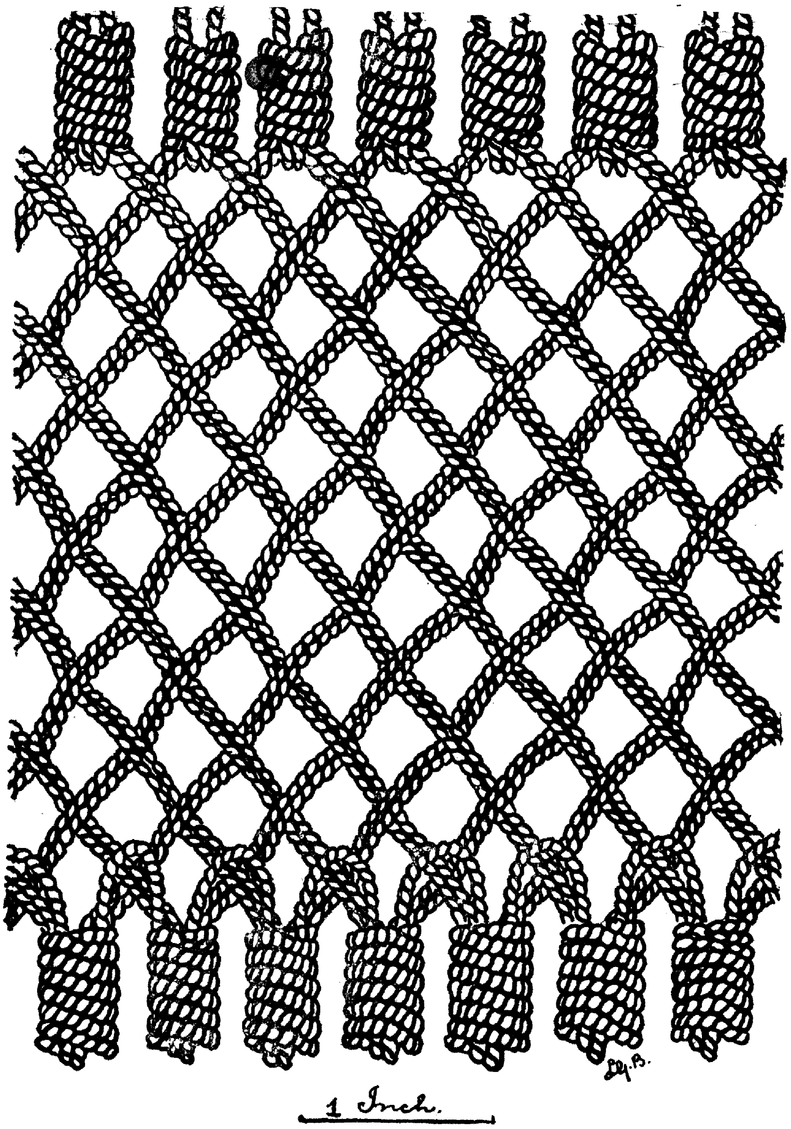


FIG. 138. HANAI E.

However, no matter what the origin, even if the knot were of foreign introduction, the natives had seen its adaptability to their work, and by their adoption of it into the manufacture of their articles, they have surely given it a domicile sufficiently Hawaiian.

There are many attractive patterns in the koko puupuu, to which no native in these days is able to attach any significance or name. One old native, after being questioned in vain, remarked disgustedly: "The haole (foreigners) want all the time to put a number or a name on everything, but these to the natives were just koko." It was thought by the writer that the different grades of alii (which were multitudinous) might be entitled to distinct styles of koko, and without doubt, the greater the chief, the better was the koko. Certain chiefs were entitled to a particular form of tabu (or kapu) and in their presence, or when their food was carried by, the common people were required to fall on their faces, sit or kneel, according to the order of the tabu. It seemed quite feasible that certain of the koko might designate the rank of the owner by the pattern and so make it known to the people, but Dr. Alexander, a recognized authority of matters Hawaiian, stated that for the purpose of proclaiming the degree of chiefship, a crier was sent before the

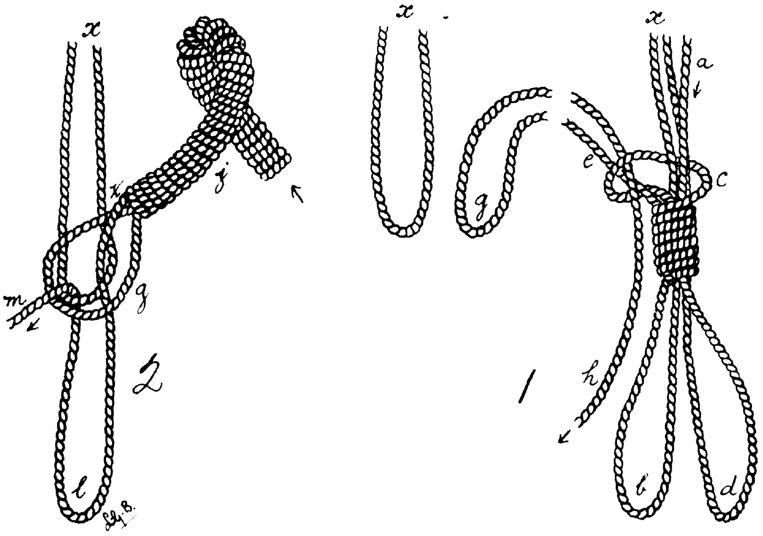
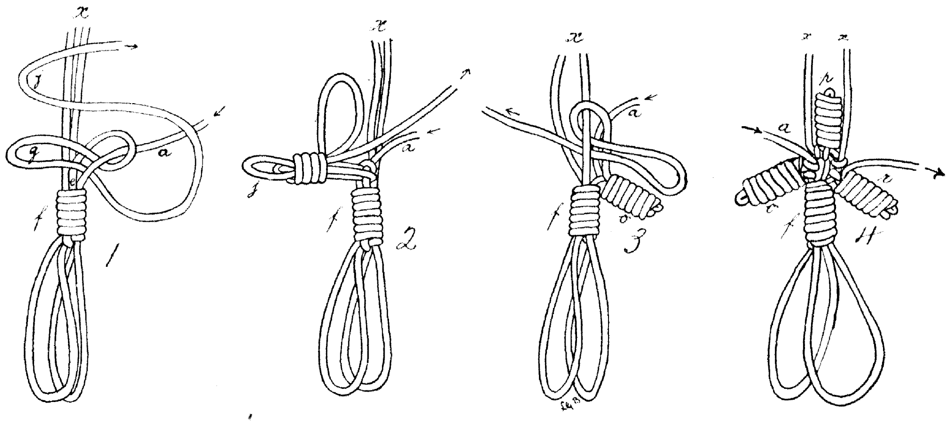

x
j
k
m
g
2
l
x
x
g
a
e
c
h
1
l
d

FIG. 139. HANAI F.


x
j
g
a
f
1
x
a
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x
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f
o
3
x
x
p
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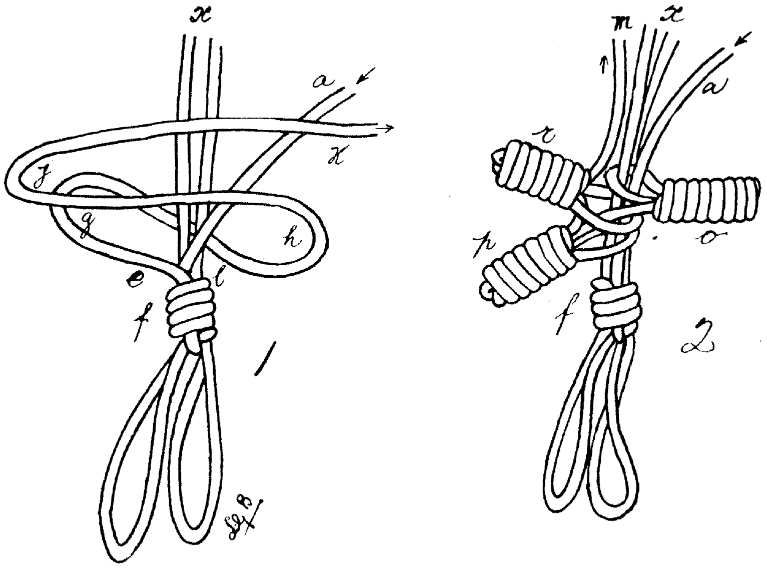
c
f
r
4

FIG. 140. HANAI G.


x
a
x
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1
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p
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2

FIG. 141. HANAI G.

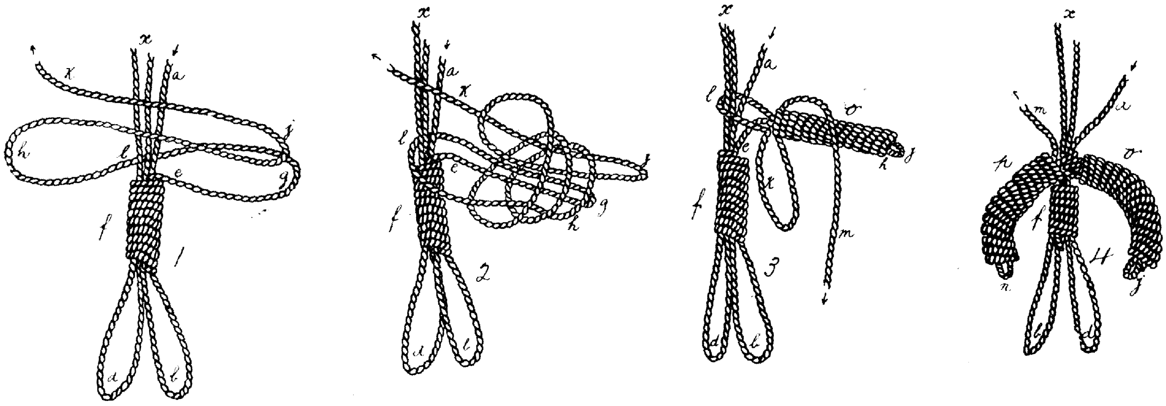
x
a
k
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FIG. 142. HANAI H.

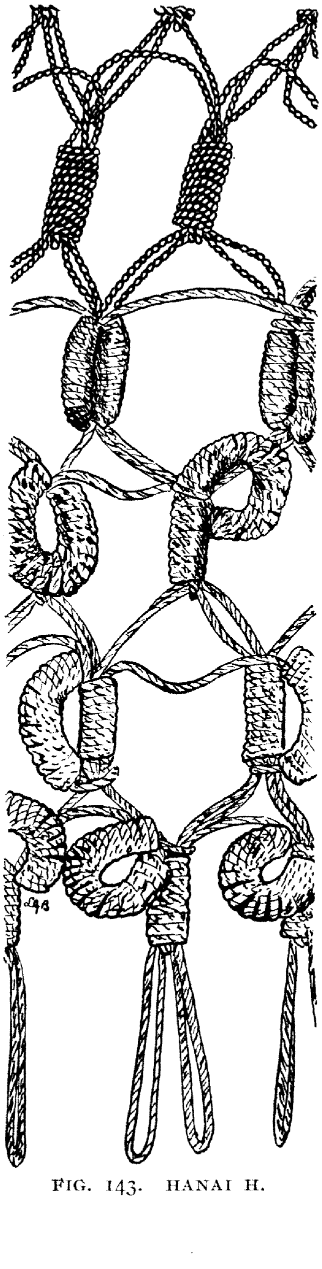

FIG. 143. HANAI H.

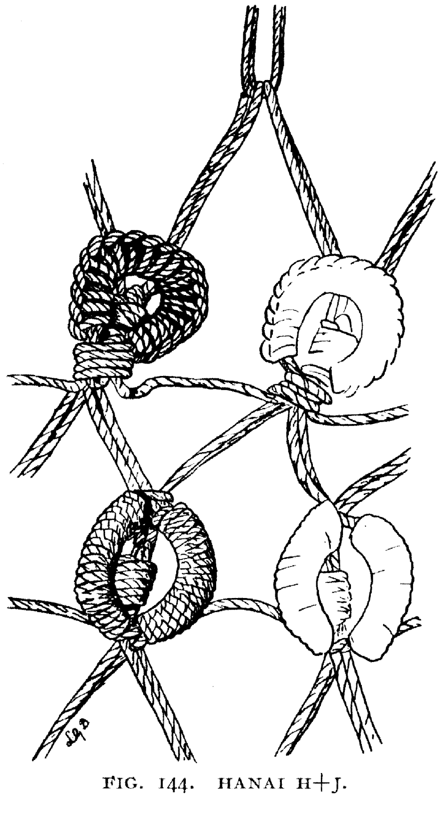

FIG. 144. HANAI H+J.

aipuupuu. An old fisherman claimed that by the creak of the koko on the umeke as the aipuupuu walked, the people could tell when the koko of a chief were approaching.

Tyerman and Bennet referred to this custom:[42] "So stately, too, was the royal etiquette, during his reign [Kamehameha I] that whoever happened to meet the king's calabash of water, as it was brought from the spring to the house, was required to unrobe, and lie down upon the earth, till the bearer of the vessel had gone by."

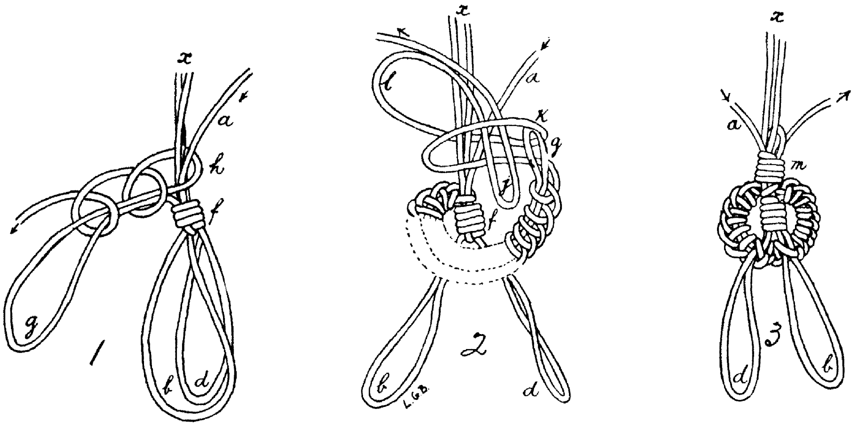

FIG. 145. HANAI J.

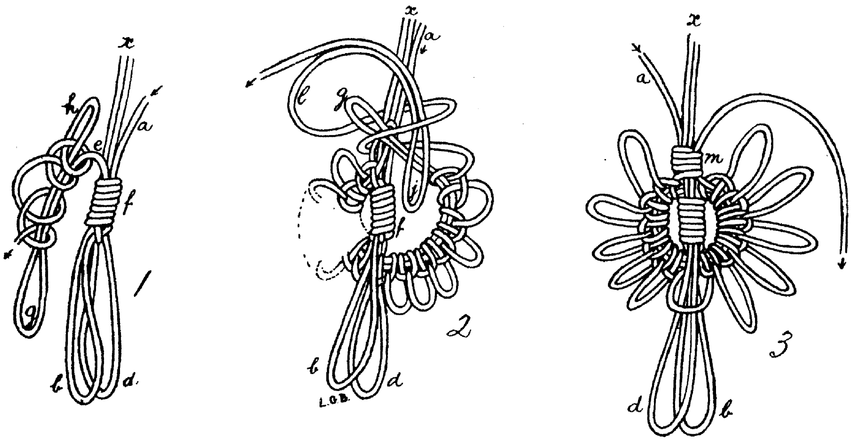

FIG. 146. HANAI K.

In Andrews' Hawaiian Dictionary, a definition of the word *maoloha* occurs as: "The ancient name of the strings or net for a calabash, equivalent to the modern word koko." Natives were questioned about any knowledge of maoloha in these days, and one old fisherman said that koko makalii or koko maoloha existed before the time of Kamehameha the First, but were now no longer; that the name was now applied to the koko carried by the man in the moon. David Malo, in his account "Moolelo

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[42] James Montgomery; Journal of Tyerman and Bennet, Vol. II, p. 69. Boston, 1832.

Hawaii,"[43] refers to the koko of Maoloha as being connected with the ceremonies of the Makahiki festival. Following the end of the services, he says: "A net [koko] with large meshes was then made, which, being lifted by four men supporting it at four corners, was filled with all kinds of food, such as taro, potatoes, breadfruit, bananas, cocoanuts, and pork, after which the priests stood forth to pray. When the kahuna [priest] in his prayer uttered the word hapai (lift) the men lifted the net and shook it back and forth, to make the food drop through the meshes, such being the purpose of the ceremony. This was called the net of Maoloha. If the food did not drop from the net, the kahuna declared there would be a famine in the land; but if it all fell out he predicted that the season would be fruitful."

Dr. Emerson adds the following interesting note to his translation: —"*Koko a Maoloha*, the net of Maoloha. The expression is used *Ke koko a Maoloha i ka lani*. Tradition says that the first appearance of the Koko of Maoloha was in time of famine, when Waia was king on Hawaii.

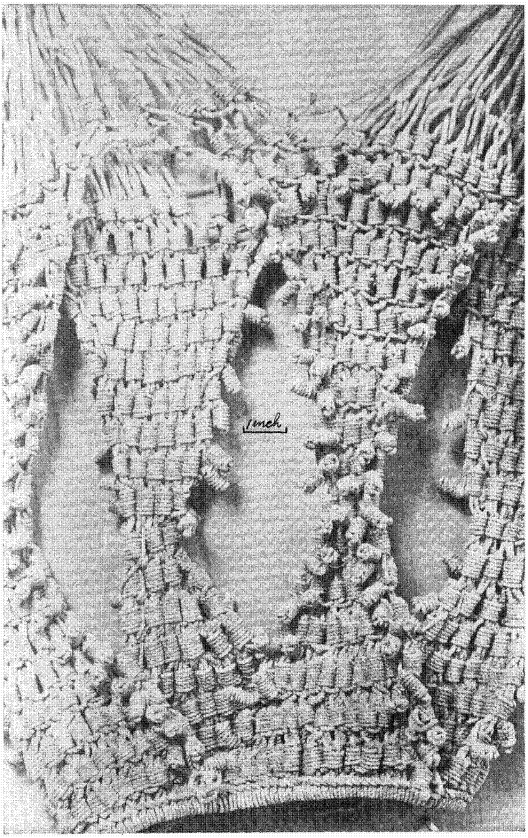

FIG. 147. HANAI L.

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[43] Hawaiian Antiquities (Moolelo Hawaii) by David Malo, Translated from the Hawaiian by Dr. N. B. Emerson. Honolulu, 1903. p. 197.

In view of the famine that distressed the land, Waia, who was a *kupua*, possessed of superhuman powers, let down from heaven a net whose four corners pointed to the North, South, East and West, and which was filled with all sorts of food, animal and vegetable. This done he shook the net and the food was scattered over the land for the benefit of the starving people." Also:[44] "Apropos of the net of *Maoloha*, at the time the net was filled with food and shaken, the following responsive service, called ka pule koko, the prayer of the net, was celebrated. The net is lifted and the kahuna opens the service saying:—

1.	E uliuli kai, e Uli ke akua e!	Oh deep-blue sea, Oh god Uli!
2.	E uli kai hakoko!	Oh blue of the wild, tossing sea!
3.	Koko lani e Uli!	Net of heaven, oh Uli.
4.	Uli lau ka ai a ke akua.	Green are the leaves of God's harvest fields.
5.	Piho lani koko; e lu—!	The net fills the heavens—Shake it!

"Then the people respond:—

6.	E lu ka ai a ke akua!	Shake down the god's food!
7.	E lu ka lani!	Scatter it oh heaven!
8.	He kau ai keia.	A season of plenty this.
9.	E lu ka honua!	Earth yield up thy plenty!
10.	He kau ai keia.	This is a season of food.
11.	Ola ka aina!	Life to the land!
12.	Ola ia Kane,	Life from Kane,
13.	Kane ke akua ola.	Kane the god of life.
14.	Ola ia Kanaloa!	Life from Kanaloa!
15.	Ke akua kupueu.	The wonder-working god.
16.	Ola na kanaka!	Life to the people!
17.	Kane i ka wai ola, e ola!	Hail Kane of the water of life! Hail!
18.	Ola ke alii Makahiki!	Life to the king of the Makahiki!
19.	Amama, ua noa.	Amama. It is free.
Kahuna:	Noa ia wai?	Free through whom?
People:	Noa ia Kane.	Free through Kane.

"Then the kahunas stand up holding their hands aloft, and the people exclaim: 'Ua noa. Ua noa. Ua noa.' At the same time holding up the left hand, and at the utterance of each sentence, striking with the right hand under the left arm-pit.

"When the kahuna utters the words '*E lu*'—in the 5th line—those who are lifting the net shake it and make its contents fall to the ground."

A legend called the "Koko a Makalii" was narrated to the writer by a Hawaiian repository for such and is here repeated in brief: "Kane, the highest god in the Hawaiian pantheon, had connection with a woman on earth and became the father of Makalii. During a time of severe drought, the people made prayers and offerings to Kane for rain, which were disregarded by the deity. Then Makalii, grieving for the starving people, declared that he would go to his father and demand rain. Provided with koko of exceeding fine mesh[45] he approached the Polynesian Jove, who welcomed his son and filled the koko with water. When Makalii returned to earth the water dropped through the meshes of the koko and fell as rain."

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[44] Ibid, p. 204-6.

It is probable that the two accounts refer to the same thing, as the pule koko recorded by Dr. Emerson would fit the Koko a Makalii, if anything, better than the Koko a Maoloha. As far as known, no such net as that used in the ceremonies has ever been preserved. There may have been a service at the end of the makahiki festival somewhat similar to that described by Malo in commemoration of Makalii's daring and beneficial act, but Malo's account is so nearly parallel with that of Peter's vision[46] that the two must have been confused. At the time of Malo's conversion to

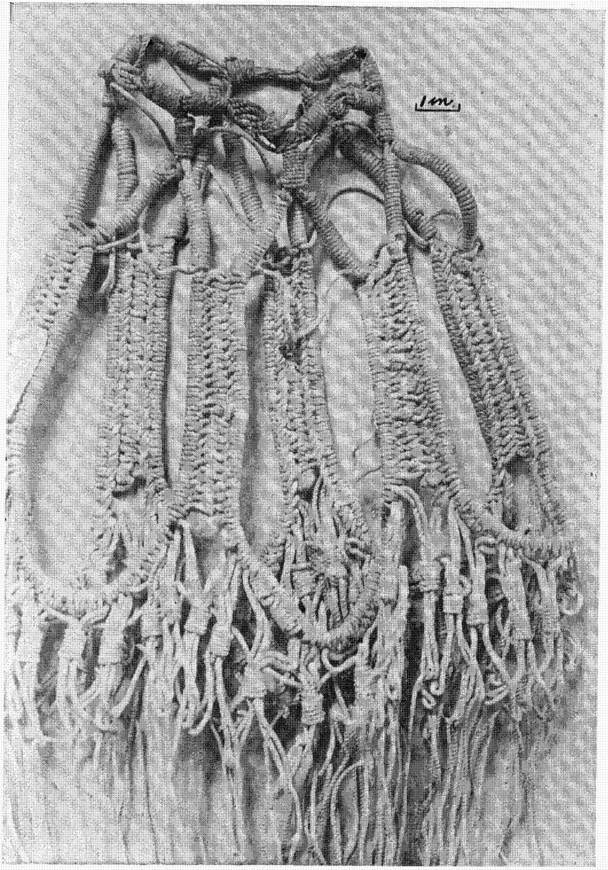

FIG. 148. HANAI M.

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[45] Maka = mesh, and lii = small.

[46] Acts, 10; 11, 12.

the Christian religion he was considered exceptionally well versed in native traditions, but following the change he became an ardent but narrow Christian, unable to distinguish between good or bad in the native lore, and condemning the whole as evil. While his mind overflowed with biblical accounts, he wrote his "Moolelo Hawaii," so that it would be quite natural for a bible story to occasionally creep into his relations.

In the following lists of koko in the Museum, the measurements are given in inches. The length mentioned is only that of the hanai and piko combined, the kakai being about as long again. The pu of the kakai is uo unless specified otherwise. A comparison of the size of the knot or puu with the mesh will give an idea as to the closeness of some of the netting, and it is quite probable that those koko with the very fine mesh were used as eke, as such are generally accompanied with a piko, the ring of which is very small.

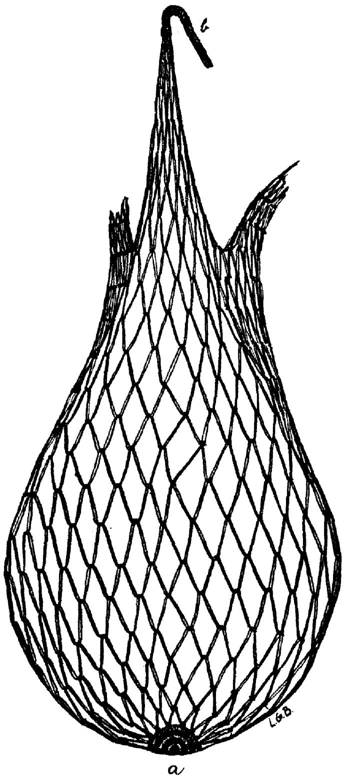

FIG. 149.

KOKO PUALU.

4423. Ahuawa; Piko A, Hanai C; length 21, mesh 2.2; kakai, pu lino; heavy cord.
4424. Coir; Piko A, Hanai C; length 19, mesh 3.4; rope.
4425. Ahuawa; Piko D (small), Hanai C; length 22, mesh 2.9; kakai, pu lino; heavy cord.
4426. Coir; Piko E, Hanai A; length 30, mesh 9; kakai, pu lino; rope.
4427. Coir; Piko A (small, diam. 1), Hanai C; length 16, mesh 4.8; heavy cord.
4428. Coir; Piko A, Hanai C; length 30, mesh 8; heavy cord.
4429. Coir; Piko E, Hanai A; length 14, mesh 5; kakai, pu lino.
4430. Coir; Piko E, Hanai A; length 17, mesh 5.5; kakai, pu lino.
4431. Coir; Piko E, Hanai A; length 18, mesh 5.5; kakai, pu lino.
4432. Coir; Piko E, Hanai A; length 14.5, mesh 5.5; kakai, pu lino.
4433. Coir; Piko E, Hanai A; length 19, mesh 6.6.
4434. Coir; Piko D, Hanai A; length 12, mesh 3.1.
4435. Coir; Piko D, Hanai A; length 12.5, mesh 3.3.
4436. Coir; Piko D, Hanai A; length 13, mesh 3.2.
4437. Coir; Piko E, Hanai A; length 27, mesh 9.5; no kakai; heavy cord.
4438. Coir; Piko E, Hanai A; length 18, mesh 5; kakai without pu.
4439. Hau; Piko C, Hanai A; length 16, mesh 7.3.
4440. Coir; Piko D, Hanai A; length 18.5, mesh 5.7.
4441. Coir; Piko D, Hanai A; length 18, mesh 5.2.
4442. Coir; Piko C, Hanai A; length 13, mesh 4.3; heavy cord. Fig. 114.

4448. Oloná; Piko C, Hanai A; length 20.5, mesh 7.5.
4449. Waoke; Piko A, Hanai A; length 12, mesh 5; kakai, pu lino.
4450. Waoke; Piko C, Hanai A; length 7.5, mesh 1.6.
4452. Cotton cord; Piko D, Hanai A; length 6.5, mesh 4.
4453. Waoke; Piko D, Hanai C; length 12.5, mesh 3.5.
4463. Coir; Piko B, Hanai A; length 12, mesh 1.2; no kakai.
6859. Coir; Piko C, Hanai A; length 17, mesh 5.6.
9017. Hau; Piko E, Hanai A; length 8, mesh 4.5.
9018. Coir; Piko A, Hanai C; length 15, mesh 4.5.
9019. Coir; Piko C, Hanai C; length 23, mesh 8.
9020. Coir; Piko A, Hanai C; length 29, mesh 7.5; heavy cord.

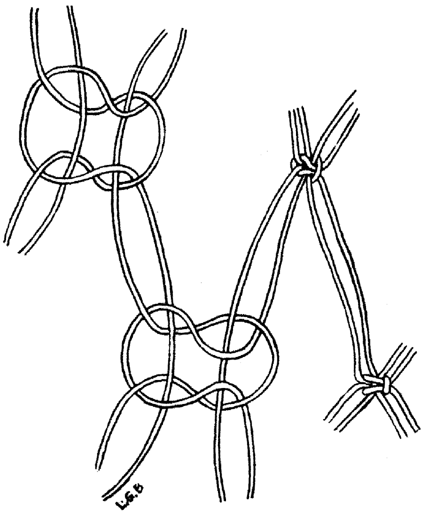

FIG. 150.

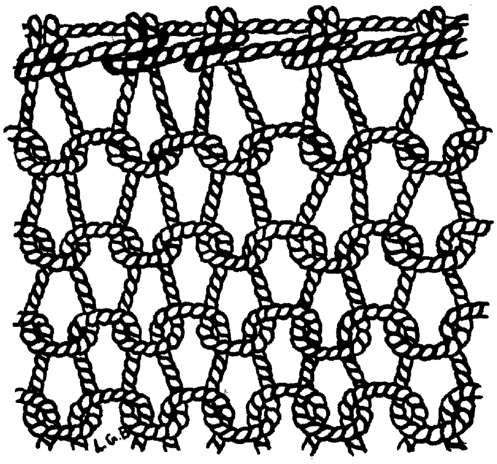

FIG. 151. HANAI OF PLAIN KNITTING.

9021. Coir; Piko D, Hanai C; length 14, mesh 4.5.
9022. Coir; Piko E, Hanai A; length 30, mesh 10.2–11.8; heavy cord.
9023. Coir; Piko E, Hanai A; length 22, mesh 9.2.
9024. Coir; Piko D, Hanai A; length 17.5, mesh 4.5.
9025. Coir; Piko D, Hanai A; length 17, mesh 3.8.
9026. Coir; Piko E, Hanai A; length 16.5, mesh 6.5; kakai, pu lino.
9027. Coir; Piko D, Hanai A; length 14, mesh 3.
9028. Coir; Piko E, Hanai A; length 15.5, mesh 6.2; kakai, pu lino.
9029. Coir; Piko D, Hanai A; length 14, mesh 4.3.
9049. Coir; Piko E, Hanai A; length 20, mesh 6; heavy cord.
L 196. Hau; Piko E, Hanai A; length 11, mesh 6.
L 197. Coir; Piko D, Hanai C; length 23, mesh 12.
L 198. Coir; Piko E, Hanai A; length 16, mesh 11.5; kakai, pu lino.
L 394. Coir; Piko E, Hanai A; length 10.5, mesh 6.7.
L 395. Coir; Piko D, Hanai C; length 13, mesh 13.
L 396. Coir; Piko E, Hanai A; length 14.5, mesh 9.

Koko Puupuu.

3070. Onionio, coir and horsehair; Piko N, Hanai D; length 16.5, mesh 3.2; puu 1 inch long.

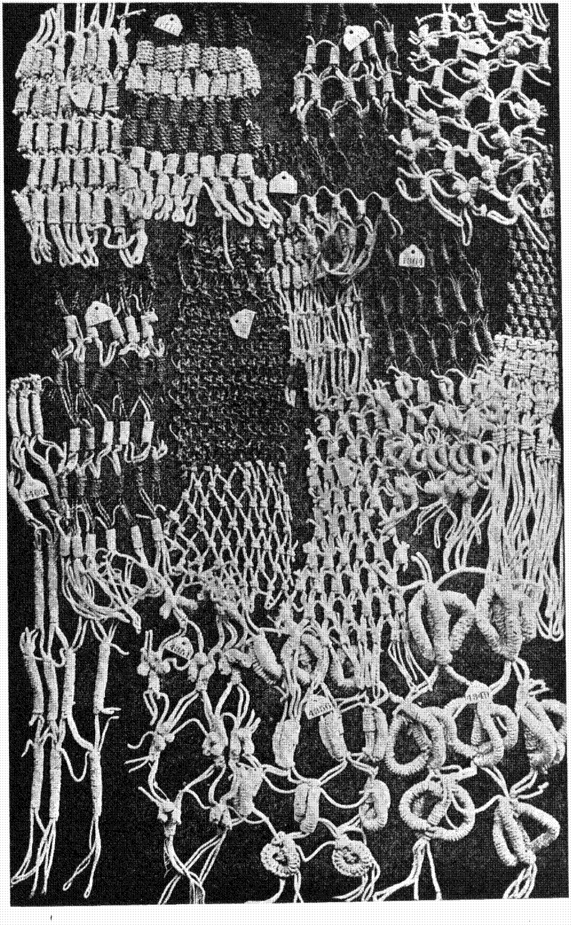

FIG. 152. SAMPLES OF KOKO.

3071. Onionio, coir and horsehair; Piko N, Hanai D; length 16, mesh 3, puu 1.

4346. Waoke; Piko J roughly made, Hanai G with 2 puu; length 17.5, mesh 3.2, puu 1.2.

4347. Pauku, coir and waoke; Piko F, Hanai D; length 13, mesh 2.3, puu .5; no kakai.

4348. Pauku, coir and oloná; Piko D (small, .6 diam.), Hanai B+D; length 24 (16+8), mesh 4+1.7, puu .3+.5; no kakai.

4349. Waoke; Piko N (27 in circumference), Hanai H with 3 puu; length 16.5, mesh 6, puu 1.8.

4350. Waoke; Piko F, Fig. 122, Hanai D; length 13, mesh 1.8, puu .8.

4351. Waoke; Piko N, Hanai G with 3 puu, Fig. 131; length 15, mesh 4.5, puu .7.

4352. Waoke; Piko N, Hanai G with 3 puu; length 12, mesh 3.5, puu .5; no kakai.

4353. Waoke; Piko N (24 in circ.), Hanai G with 3 puu; length 12, mesh 2.1, puu .6.

4354. Waoke; Piko N (large), Hanai G with 3 puu; length 11.5, mesh 1.5, puu .6.

4355. Waoke; Piko H, Hanai G with 1 puu; length 16, mesh 2, puu .6. Fig. 105 c; koko inverted.

4356. Oloná; Piko N, Hanai H+J, Fig. 144; length 15.5, mesh 5.7, puu .6.

4357. Oloná; Piko N, Hanai M; length 14.2. Fig. 148.

4358. Oloná; Piko F, Hanai L; length 15, mesh .8, puu .4. Fig. 147.

4359. Pauku, coir and waoke; Piko C, Hanai B; length 15, mesh .6, knot .4; no kakai.

4360. Pauku, coir and waoke; Piko D (.6 diam.), Hanai B; length 21.5, mesh .4, knot .2.

4361. Pauku, coir and waoke; Piko O, Hanai D; length 9, mesh .8, puu .7; damaged, no kakai.

4362. Pauku, coir and waoke; Piko O, Hanai D; length 12, mesh .5+1.5, puu .5+.6.

4363. Oloná; Piko N (27 in circumference), Hanai K; length 21, mesh 2.8. Fig. 105 d; koko inverted.

4364. Pauku, coir and waoke; Piko F, Hanai D + H, Fig. 143; length 14, mesh 2.5, puu .6; no kakai.

4365. Pauku, coir and waoke; Piko A, Hanai A+B; length 13, mesh .3+1; kakai with 1 pu uo bound together at the two ends. Fig. 134.

4366. Pauku, coir and waoke; Piko O (1 diam., Fig. 133), Hanai D; length 20, mesh .7–2.3, puu .6–1.8; no kakai.

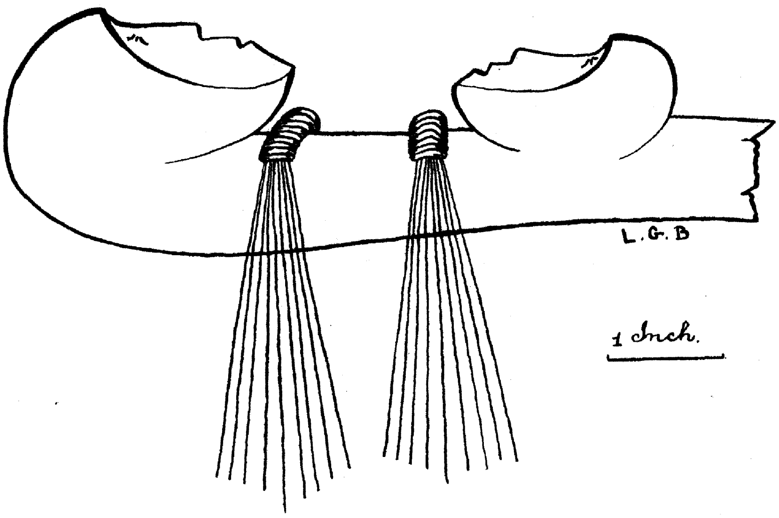

FIG. 153. END OF AUAMO SHOWING PU UO.

4367. Pauku, coir and waoke; Piko F (18 in circumference), Hanai D; length 14, mesh 1–1.4, puu .6–.8; no kakai.

4368. Pauku, coir and waoke; Piko O, Hanai D; length 17, mesh .6–2.4, puu .5–1.4.

4369. Pauku, coir and waoke; Piko K, Hanai D; length 11.5, mesh 2.5, puu .6.

4370. Pauku, coir and waoke; Piko N, Hanai D; length 21.5, mesh 3.3, puu .4–.8.

4371. Pauku, coir and waoke; Piko F, Hanai D; length 15.5, mesh 2.5–3.2, puu .6–.8.

4372. Pauku, coir and waoke; Piko F, Hanai D; length 13.5, mesh 3, puu .9–1.4; no kakai.

4373. Pauku, coir and waoke; Piko N, Hanai D; length 20.5, mesh 2.3, puu .6.

4374. Pauku, coir and waoke; Piko N, Hanai D; length 25, mesh 3.4, puu .7.

4375. Pauku, coir and waoke; Piko N, Hanai D; length 12.2; mesh 2.4, puu .7.

4376. Pauku, coir and waoke; Piko F, Hanai D; length 11, mesh 2.1, puu .4; no kakai.

4377. Pauku, coir and waoke; Piko N, Hanai D; length 15, mesh 3.1, puu .7; no kakai.

4378. Pauku, coir and waoke; Piko J, Hanai D; length 15, mesh 2.9, puu .8; no kakai.

4379. Pauku, coir and waoke; Piko J (21 in circumference), Hanai D; length 13, mesh 4, puu .8.

4380. Pauku, coir and waoke; Piko F, Hanai D; length 17, mesh 2.4, puu .8; no kakai.

4381. Pauku, coir and waoke; Piko N, Hanai D; length 18, mesh 3, puu .7; no kakai.

4382. Pauku, coir and waoke; Piko N, Hanai D; length 13, mesh 2.8, puu .7.

4383. Pauku, coir and waoke; Piko N, Hanai D; length 12, mesh 2.7, puu .7.

4384. Pauku, coir and waoke; Piko N, Hanai D; length 15.5, mesh 3.2, puu .8.

4385. Onionio, coir and waoke; Piko F, Hanai D; length 14, mesh 2.1, puu .8.

4386. Oloná; Piko F, Hanai D; length 22, mesh 5–6.5, puu .9–1.1.

4387. Waoke; Piko F, Hanai D; length 20, mesh 1.8–2.5, puu .6.

4388. Waoke; Piko M, Hanai D; length 9.6, mesh 1.3, puu .4.

4389. Oloná; Piko G, Hanai D; length 11, mesh 2.3, puu .8.

4390. Waoke; Piko F, Hanai D; length 14.5, mesh 2, puu .5.

4391. Waoke; Piko F, Hanai D; length 10.5, mesh 2, puu .6.

4392. Waoke; Piko F (1 in diam.), Hanai D; length 15.5, mesh 2, puu .9; no kakai.

4393. Waoke; Piko N, Hanai D; length 10.5, mesh 1.8, puu .8.

4394. Oloná; Piko G, Hanai D; length 17, mesh 1.6, puu 7.

4395. Waoke; Piko K, Hanai D; length 10, mesh 1.7, puu .5.

4397. Oloná; Piko F, Hanai D; length 13, mesh 3.1, puu 1.3.

4398. Waoke; Piko F (1.2 diam.), Hanai D; length 10.5, mesh 2.3, puu .9.

4399. Waoke; Piko F, Hanai D; length 10, mesh 1.9, puu .9; no kakai.

4400. Waoke; Piko H (.6 in diam.), Hanai D; length 15.5, mesh 3.5, puu .7; no kakai.

4401. Waoke; Piko F, Hanai D; length 14.5, mesh 4.6, puu .6–.8.

4402. Waoke; Piko A (.8 in diam.), Hanai D; length 14.5, mesh 3, puu .6.

4403. Oloná hanai and waoke kakai; Piko F, Hanai D; length 14, mesh 2.8, puu 1.1.

4404. Oloná; Piko F, Hanai D; length 8.5, mesh 2.7, puu .4.

4405. Oloná; Piko G, Hanai D; length 12.5, mesh 2.6, puu .8.

4406. Waoke; Piko K, Hanai D; length 12, mesh 2.1, puu .7.

4407. Waoke; Piko K, Hanai D; length 11, mesh 2.1, puu .7.

4408. Oloná; Piko F, Hanai D; length 23, mesh 8, puu .8.

4409. Waoke; Piko F, Hanai D; length 17, mesh 3.7–4, puu 1.5–2.2 long and thin; no kakai.

4410. Onionio, coir and waoke; Piko H, Hanai D; length 12, mesh 1, puu .7; no kakai.

4411. Onionio, coir and waoke; Piko N, Hanai D; length 17.5, mesh 3, puu .6–.7; no kakai.

4413. Pauku, coir and waoke; Piko N, Hanai D; length 9, mesh 2.8, puu .5.

4414. Onionio, coir and waoke; Piko N, Hanai D; length 13.5, mesh 2.8, puu .7.

4415. Pauku, coir and waoke; Piko N, Hanai D; length 14, mesh 3, puu .9.

4416. Onionio, coir, waoke and horsehair; Piko N, Hanai D; length 15.5, mesh 2.7, puu .8.

4417. Pauku, coir and waoke; Piko N, Hanai D; length 15.5, mesh 2.9, puu .8.

4418. Onionio, coir, waoke and horsehair; Piko F, Hanai D; length 11, mesh 2.1, puu .6; no kakai.

4419. Waoke; Piko F, Hanai D; length 9.2, mesh 2.3, puu .7.

4420. Onionio, coir and waoke; Piko E, Hanai B; length 14.5, mesh 3.

4421. Pauku, coir and waoke; Piko A, Hanai B; length 10.5, mesh 2.3.

4444. Pauku, coir and waoke; Piko D (?), Hanai B; length 17, mesh 4.3, knot .5; modern looking.

4445. Pauku, coir and waoke; Piko A, Hanai A; length 19; mesh 3.

4446. Pauku, coir and waoke; Piko D, Hanai B; length 16.5; mesh 5.5.

4447. Pauku, coir and waoke; Piko B, Hanai B; length 19, mesh 4.7, knot .4.

4456. Waoke; Piko F, Hanai E; length 21, mesh 3.5–5, puu .5. Fig. 105 *a*.

4457. Pauku, coir and waoke; Piko N, Hanai D; length 12, mesh 2.7, puu .8.

4458. Pauku, coir and waoke; Piko N, Hanai D; length 17, mesh 2.5, puu .7.

4459. Waoke; Piko N, Hanai D; length 10, mesh 2.4, puu .5.

4460. Pauku, coir and waoke; Piko N, Hanai D; length 13, mesh 2.5, puu .7.

4461. Waoke; Piko J (Fig. 126), Hanai D; length 10, mesh 2.4, puu .7.

4462. Pauku, coir and waoke; Piko F, Hanai D; length 9.5, mesh 2, puu .5.

4464. Waoke; Piko F, Hanai D; length 12, mesh 1.4–2.3, puu .9. Figs. 120, 121.

4465. Waoke; Piko F, Hanai D; length 13.5, mesh 1.7, puu .9.

5324. Coir; Piko O, Hanai D; length 8.4, mesh 1.1–1.3, puu .6–1; fragment, lower two-thirds only.

6857. Waoke; Piko F, Hanai E; length 20, mesh 4.2, puu .4. Fig. 104 *a*.

6858. Waoke; Piko F, Hanai D; length 8.8, mesh 2.2, puu .3.

7703. Waoke; Piko L, Hanai F; length 15, mesh 3, puu .6. Fig. 115.

7706. Pauku, coir and waoke; Piko F (.6 diam.), Hanai B; length 16, mesh .8.

7707. Waoke; Piko F, Hanai D; length 15, mesh 1.7, puu .6; no kakai.

7708. Pauku, coir and waoke; Piko D (.4 diam.), Hanai B; length 21, mesh .8; no kakai.

7748. Pauku, coir and waoke; Piko F (1 diam.), Hanai D; length 15, mesh 2.3, puu .6.

7966. Waoke; Piko N, Hanai D; length 15, mesh 2.5, puu .8.

9013. Waoke; Piko K, Hanai D; length 10.5, mesh 2, puu .8.

9014. Pauku, coir and waoke; Piko N, Hanai D; length 15, mesh 2, puu 1.

9015. Onionio, coir, waoke and horsehair; Piko N, Hanai D; length 17, mesh 3, puu 1.

9016. Waoke; Piko N, Hanai G with 3 puu; length 13, mesh 3, puu .4.

9050. Waoke; Piko F, hanai of plain knitting; length 6.9, mesh .3.

L 92. { Pauku, coir and waoke; Piko O, Hanai D; length 10.5, mesh .5–1.5, puu .4–1.1.
Oloná; Piko F (large), hanai of plain knitting (Fig. 151); length 12.5, mesh .4.

L 194. Pauku, coir and waoke; Piko D (.3 diam.), Hanai B; length 15, mesh .5, knot .3; kakai in four parts.

L 195. Pauku, coir and waoke; Piko N, Hanai D; length 17, mesh 3, puu 1.

L 397. Coir; Piko F, Hanai D; length 9, mesh 2.5, puu .8; fragment, no kakai.

KOKO EKE.

4422. Cotton cord; Piko (?), hanai, foreign knot, probably Chinese; length 20, mesh 4.2.

4451. Waoke; Piko D, Hanai C; length 12.7, mesh 3.5; kakai, a double draw string. Fig. 136.

9051. Waoke; Piko D, Hanai C; length 11.8, mesh 5; kakai, draw string.

MISCELLANEOUS.

4454. Foreign koko; length 37.5, mesh 2.2. Figs. 149 and 150.
4455. Foreign koko; black woolen braid; knot, Fig. 150; length 20, mesh 2.6.

Aha.—Of the aha[47] or cords surrounding and permanently fastened to gourd water bottles (huewai, olowai, etc.) the most common was that known as *hawele*—sometimes referred to as koko hawele—and shown in Fig. 106 enclosing a huewai. There is in the collection a great number of drinking and other gourd vessels without cordings which would have been carried in koko puupuu or pualu. The huewai was a drinking gourd of large body and narrow neck for general use. The variety of forms of gourd vessels was very great, and was generally the result of manipulation when the fruit was green.

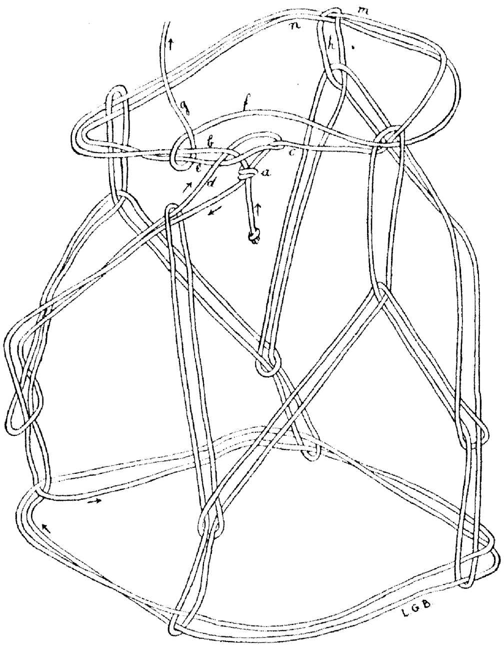

FIG. 154. DETAIL OF AHA HAWELE.

The word hawele means a tying or binding on in which the joinings or loops are never knotted, and the koko or aha hawele may be so recognized. Details of technique of the aha hawele in Fig. 106 will be seen in Fig. 154, where, after a loop, *b m c*, is made round the neck of the bottle and tied at *a*, the cording continues in the direction indicated. There is a slight error, for which the writer is responsible, in the drawing, for the cord *f*, instead of encircling *b* and *e*, should pass under and over *a* and *d* and under itself. A bail is then made by carrying *g* over the top of the bottle, over *m*, under *h*, over *n* and back around *a* and *d*. When there are four or five thicknesses of cord in the bail, it is bound at several points with half hitches by the end of *g*, the latter being finally fastened to the wooden or shell stopper. The material used was coir, spun or braided—seldom oloná or hau. A similar lashing, but more complex, was noticed on a gourd water bottle, No. 1931, from New Caledonia.

A very neat fastening of the aha hawele has been made around a huewai pueo (Fig. 155) which is a water gourd shaped like an hour glass. In the figure, when the aha hawele, as shown in Figs. 106 and 154, was attached to the lower bulb, to its upper cords another binding was added for the purpose of enclosing the other part. However, in a great number of the pueo with hawele the lower bulb is alone corded and the bail fastened to the waist. A plain and chaste style of aha hawele was found on an old broken huewai in the collection Fig. 156, the cord of which was more neatly braided than on any of the other specimens. Another form, rarely used, is shown in Fig. 157.

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[47] Aha should be applied only to (1) coir cord, (2) cord of human hair, (3) strings made from intestines. (See Andrews' Dictionary.) Other cords, such as oloná, should be termed *aho*.

A form of water gourd used in the canoes was called olowai, Fig. 107. The writer has not been able to learn any specific name for the aha on this gourd, and since only two (Nos. 3877 and 3880) out of the five specimens in the collection have aha exactly similar, the probabilities are that each individual followed his own taste in cording. In the aha figured, Fig. 107, the work was done by making two half hitches on the bottom of the gourd, and on the rings thus made four loops of single cord were formed large enough to reach the middle. The cord was then brought to the neck of the bottle and fastened by two half hitches. A set of four loops was attached to these rings, at the same time passing in turn through the bights of the previous set, thus drawing the lashings tightly around the gourd. The cord was then made to follow the cords of each loop and an eye was formed by tying at each bight. The double ring at the middle was added last. For the bail, suspended over the side of the bottle, a separate cord was used. Another aha, on specimen No. 3995, is similar to that in Fig. 107, except for the double ring in the middle. Of the other specimens of corded olowai, one, No. 3879, is enclosed in an aha hawele, and the other, No. 3881, in a large-meshed netting.

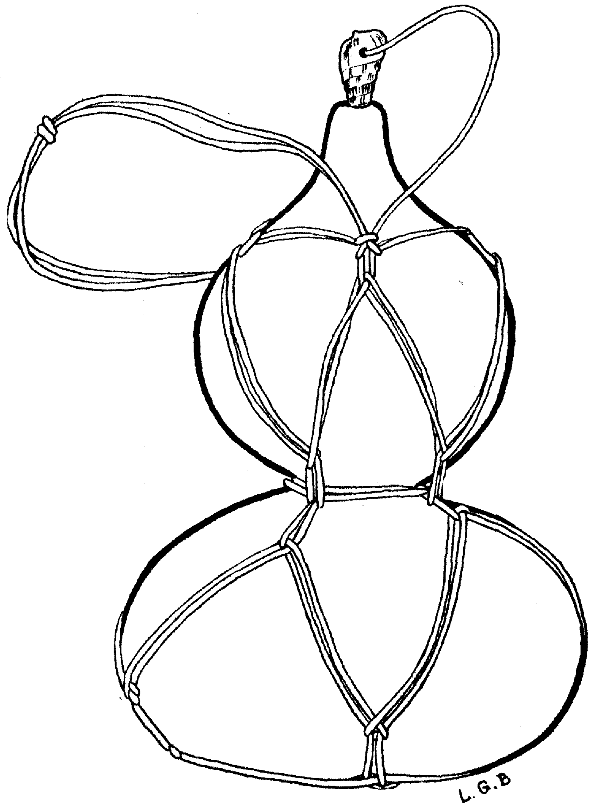

FIG. 155. HUEWAI PUEO WITH AHA HAWELE.

Ipu le'i, *ipu holoholona*, *poho aho* and *ipu aho* are among the names used to designate a utensil, consisting of two pieces, for containing fish hooks and lines. There are two general forms of this article: one with the lower and smaller part of wood covered with a larger gourd, Figs. 158 and 159, and the other of gourd with the lower larger than the upper part, Fig. 160. There is some confusion now as to the correct names and uses of the different styles, but the best information seems to be that the former, called ipu le'i or ipu holoholona, was for the purpose of holding bait in addition to hooks and lines, and the latter, poho aho, for the fishing tools alone. Some of the poho aho were composed of bowl-shaped gourds, and others of long narrow gourds, covered with half a small gourd or coconut.

Similar cordings enclosed both styles, and the most finished in appearance is that around the ipu le'i in Fig. 158. This cording, called koko, or koko ipu le'i, is a combination of the aha hawele firmly fastened around the wooden part, to the upper cords of which a netting is attached to enclose the cover. The netting is closed around the cover by a draw string, which also serves to carry the utensil. In a few specimens the aha hawele has been dispensed with, the netting being fastened through holes bored in the upper edge of the lower part, Fig. 159. This last method was also used on the *hinai poepoe*, which have been treated by Dr. Brigham in the previous portion of this memoir. Another and simpler method of attaching cords to these articles is shown in Fig. 160; here the edge of the lower part has been pierced at two opposite points, from which two cords were led upwards through holes in the cover.

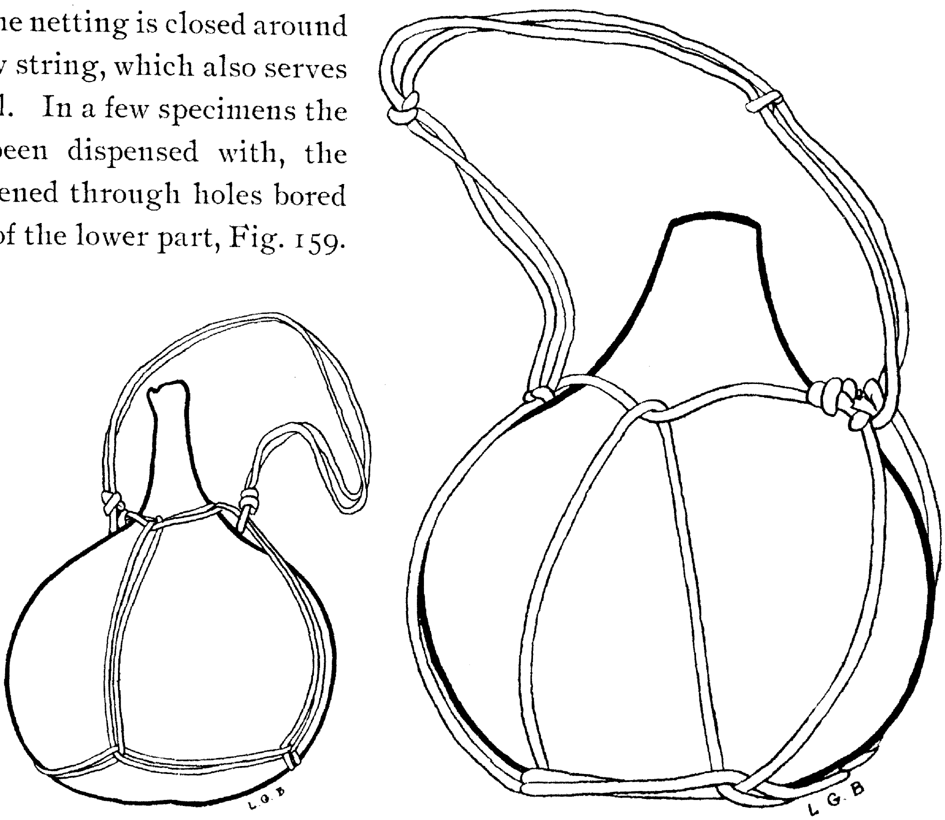

FIG. 156. FIG. 157.

HUEWAI WITH AHA HAWELE.

Before passing from the gourd cordings, it might be in order to mention the several means of securing handles to gourds in vogue among the natives. The simplest form noticed is a coir or hau cord around the neck of the huewai, when the mouth of the gourd bulges, Fig. 161*a*; some of the cords were roughly made and tied, but in others the cord has been braided and then attached by a double half hitch. A few of the huewai pueo have also been treated in this manner, Fig. 161 *b*. When the huewai was not pueo or bulged at the mouth, then a handle was sometimes attached by making a hole at the base of the neck and through it drawing and knotting both ends of a loop of coir or hau cord or braid, Fig. 161 *d*, or, by boring the edge of the mouth at two points opposite, through which the ends of a hau or oloná line were passed and knotted. Fig. 161 *c.*

In some of the bowl-shaped gourds, eight holes were pierced in pairs and each end of two cords passed through two of the holes and knotted, Fig. 162. Handles, generally more than two, were so attached to many of the hinai poepoe, and *ieie* and pandanus baskets.

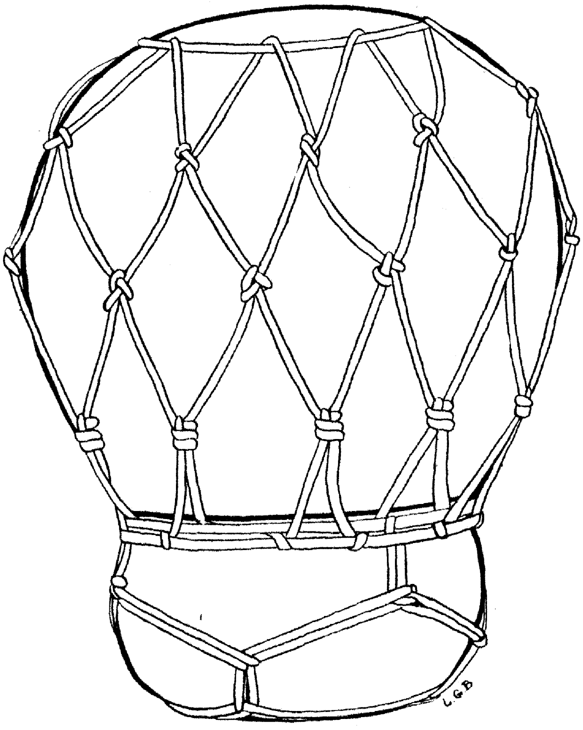

FIG. 158. IPU LEI.

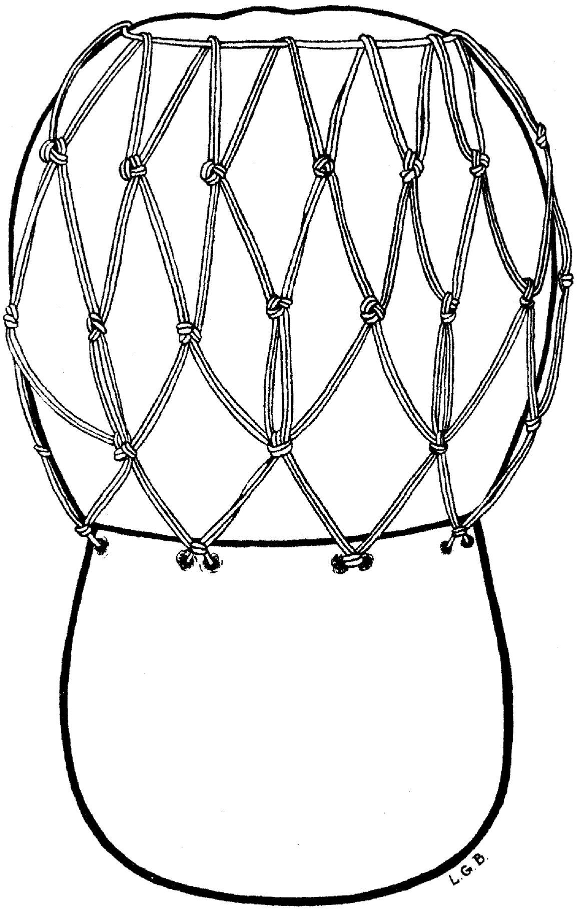

FIG. 159. IPU LEI.

LIST OF GOURD VESSELS, WITH CORDINGS ATTACHED.

1093. Huewai; aha hawele, coir.
1094. Huewai; aha hawele, coir.
1099. Huewai, aha hawele, coir.
1100. Huewai; aha hawele, coir.
1101. Huewai; aha hawele, coir, Fig. 156.
1102. Huewai; aha hawele, cotton cord.
1104. Huewai; aha hawele, coir.
1107. Huewai; aha hawele, coir.
1112. Huewai pueo; aha hawele, coir, Fig. 155.
1113. Huewai pueo; aha hawele, coir.
1114. Huewai pueo; aha hawele, coir.
1121. Huewai; aha hawele, coir.
1122. Huewai; aha hawele, coir.
1124. Huewai; aha hawele, coir.
1128. Huewai; aha hawele, coir.
1129. Huewai; aha hawele, coir, Fig. 106.

1133. Huewai; aha hawele, oloná.
1137. Huewai; aha hawele, coir.
1261. Huewai pueo; aha hawele, coir.
3934. Huewai; aha hawele, hau, Fig. 157.

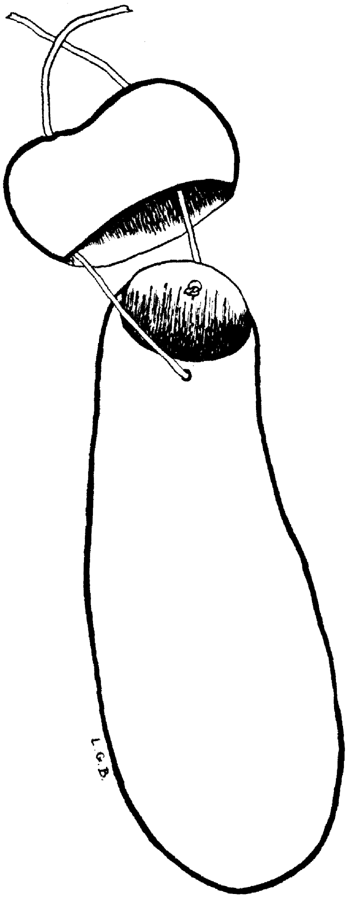

FIG. 160. POHO AHO WITH CORD.

3935. Huewai; aha hawele, coir.
3938. Huewai; aha hawele, hau.
3940. Huewai; aha hawele, coir.
3996. Huewai pueo; aha hawele, coir.
7750. Huewai; aha hawele, hau.
1097. Huewai; coir, Fig. 161 *a*.
1108. Huewai; coir, Fig. 161 *d*.
1109. Huewai; hau, Fig. 161 *c*.
1111. Huewai pueo; coir, Fig. 161 *b*.
3942. Huewai; hau, Fig. 161 *a*.
3944. Huewai; coir, Fig. 161 *a*.

7667. Huewai; oloná, Fig. 161 *d*.
7668. Huewai; coir, Fig. 161 *a*.
3877. Olowai; coir.
3879. Olowai; aha hawele, coir.

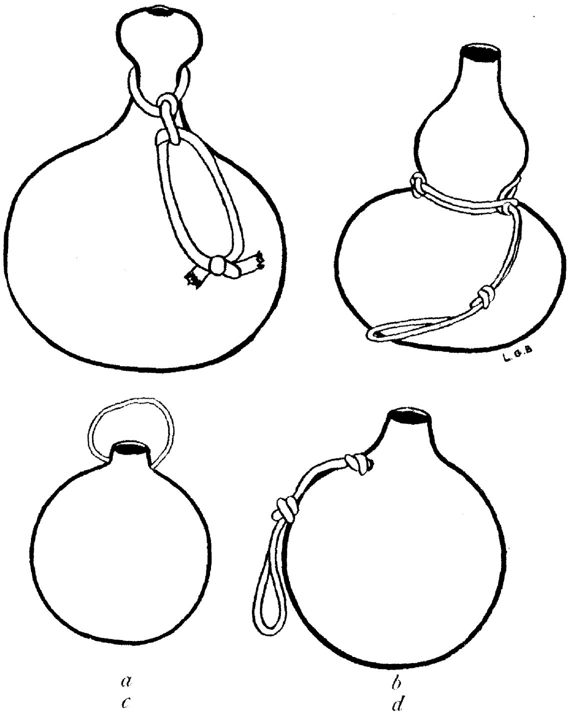

FIG. 161. HUEWAI WITH CORD HANDLES.

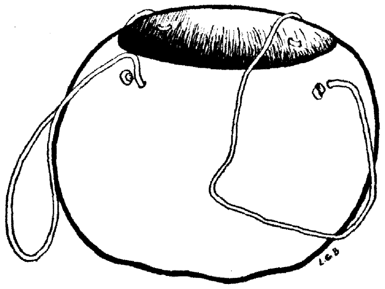

FIG. 162. GOURD UMEKE WITH CORD.

3880. Olowai; coir, Fig. 107.
3881. Olowai; coir, netted.
3995. Olowai; coir.
3951. Umeke; oloná, Fig. 162.
3952. Umeke; oloná.

IPU LE’I.

3850.	Oloná and coir.
3851.	Hau, coir and oloná.
3852.	Oloná, cords of hawele doubled.
3853.	Oloná.
3854.	Coir.
3855.	Wooden part only, pierced.
3856.	Coir, Fig. 158.
3857.	Coir, Fig. 159.
3858.	Oloná.
3859.	Oloná.
3860.	Hau.
3994.	Coir.

POHO AHO.

3861.	Oloná.
3869.	Oloná.
3870.	Oloná.
3871.	Oloná.
3872.	Oloná.
3873.	Oloná.
3874.	Oloná and coir.
3875.	Oloná, Fig. 160.
3876.	Oloná.
3927.	Coir.
3953.	Oloná.
5027.	Coir.
6373.	Coir.

Nets, Upena.—As the second division of net work, fish nets and similar fabrics for different uses come up for consideration. The material most preferred and used, except where noted below, was oloná spun into cord varying greatly in thickness.

The method of beginning a net is interesting, and has been shown to the writer by fishermen on Oahu and Molokai. The native, having filled his shuttle from the ball of twine without severing the line, takes another cord, Fig. 163 *a a*, the ends of which he ties together. Sitting on the ground with feet far apart, he inserts the first toes into the ring and stretches it tightly. The ball is passed under and over *a a* three times towards the right, and the friction on the cords is sufficient to keep the line *e* taut while closing the knots. Then the shuttle is passed around the gauge, over *a a*, under *e*, and *e* is drawn down by the shuttle cord to the gauge where the knot at *b* is made. To begin the second and alternate knots the shuttle would of course pass under *a a* and over *e*. Cord for the continuance of the loops is drawn from the ball by loosening the windings around *a a*. When the knot (called ka, umii, etc.) slips properly into place, as at *b* and *d*, the worker ejaculates *kakiokohe* with satisfaction, but if it misses the loop, as at *c*, the word *omauokole* is uttered with disgusted tone. Sometimes, as the work proceeds, two loops are by mistake enclosed by one knot, the name for which is *mauae*.

In this division come the *nae*, or netting which constitutes the groundwork of feather garments,[48] netted *malo*, bird net and the regular fish netting.

Nae.—Nae is a netting of very fine mesh, varying in the Museum feather garments from .05 to .27 inches. The twine is not as fine as the size of the mesh might suggest, averaging .025 inch in diameter, so that in some of the specimens the netting is as close as loose burlap.[49] As stated by Dr. Brigham, in Feather Work, the bases of the cloaks are composed of several pieces of nae, each being cut to fit. The pieces are not always of the same mesh, that of those in the cloak of Kiwalao, for instance, varying from .1 to .25 inch. However, the mesh of the majority varies but slightly in each individual.

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[48] B. P. B. Museum; Memoirs, vol. i, nos. 1 and 5.

The closeness of the mesh in some cloaks and capes has suggested research for a suitable shuttle to do the work, but beyond the niao, already described, and needle of kauila wood, no implement has been found. In a piece of nae, specimen No. 2840[50], prepared for the addition of feathers, the mesh increases from .05 at the top to .08 inch at the bottom and is too fine to allow even an ordinary pinhead to pass through readily. The specimen is 37.5 inches wide and 11.5 inches long, the edges of which have been trimmed at the knot without leaving the usual netting selvage. There are from four to ten rows of netting continuously in both directions, while of course in netting the rows usually alternate. This nae was made without a shuttle with lengths of twine drawn through the loops, and for such purposes the natives dipped the ends of the twine into the highly saccharine juice of the *ki* root, which, drying rapidly, made the fibre stiff enough to be threaded through the holes. It is not the intention of the writer to give the impression that all nae have a number of rows of netting continuously running in the same direction, for in most of the specimens the rows alternate regularly. The nae with a mesh of .25 inch could be and probably was made with a shuttle such as that shown in the middle of Fig. 101, or a niao.

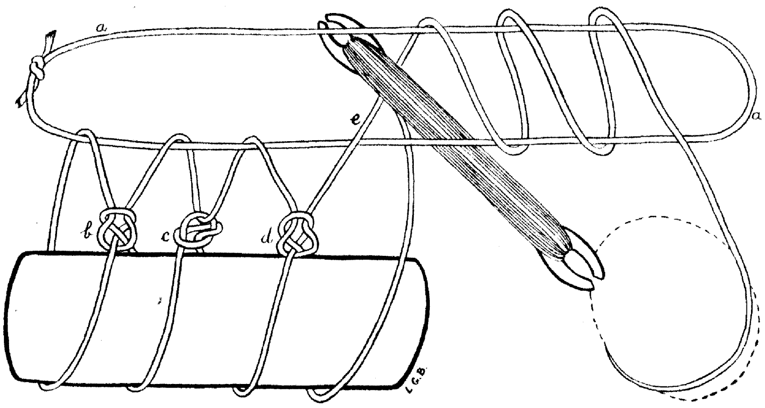

FIG. 163. COMMENCEMENT OF A NET.

In the collection is a piece of unfinished netting of rather fine mesh, the history of which is unknown. The upper part is 41 inches wide with a mesh of .25 inch increasing to .44 inch in the lower, and it has, as far as completed, the shape of a feather cloak. The first half has been made with four shuttles, one following the other, and possibly by four people, and the unfinished half with three shuttles as the three loose strings on the bottom indicate. The specimen is Hawaiian and is probably the result of an incompleted later day attempt to prepare nae for a feather cloak. Sometimes in making very broad fish nets, or when there was need for rapid manufacture, two or three men would net along the same side, following each other. The cord, of the first man to finish, was knotted to the ends of the succeeding rows when completed and was the first to begin the next series.

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[49] Ibid, pl. ix, upper figure, left side.

[50] Ibid.

Netted Malo.—Of netted malo there are two specimens in the Museum, each with a mesh of about .25 inch. One, No. 2842, is a plain piece of netting 15.3 ft. long and 7 in. wide.[51] The malo, or loin cloth, of oloná netting was always an alii's garment and was worn by him on canoe voyages.

The other specimen,[52] No. 6921, 12.2 ft. long and 5.7 in. wide, came to the Museum from the Provisional Government of Hawaii after the revolution in 1893, as a relic of royalty, with the royal feather robes. It has been the nae of a feather malo, and in sewing on the tufts of feathers, the meshes have been so compressed as to give the fabric the semblance of cloth. The stitches are in good order still, but few shafts and no feathers remain. There are not left enough fragments of feathers to even show the general color, but red, yellow and black stumps were found, all on the front end. Near this end are the remains of black feathers on the outline of a diamond, and a little nearer the middle, thread bindings indicating the former presence of a feather cross shaped like St. Andrew's. To the ends of the malo are attached rows of human molars, and to the sides near the cross a single molar. Looped to the sides, every two inches for the entire length, is a cord enclosed in a fine cylindrical netting, by which feathers have been fastened in the form of a lei.

Upena Manu.—The Museum possesses but one specimen of bird net,[53] No. 138. This is a diamond-shaped net, mesh 5 inches, made with the same sized twine as in nae. Its total length when stretched is 16.25 feet, and in width it increases from 18 meshes at the beginning to 40 meshes at the middle, thence diminishing to 13 meshes at the end. At each end the meshes are bound together. The increase of the number of meshes in a row is accomplished by running on an additional loop (as at *g*, Fig. 111) at regular intervals, while the decrease is effected by the use of the mauae knot, called *makakukai*. A cord of about .1 inch in thickness is run along both sides, but there are no sticks attached, nor any place for attachment. The net has been tanned and, where broken, mended with tanned and untanned twine. The method of use is unknown, but judging from the large mesh and fine twine it was used for entangling. Natives have told the writer of two methods of bird-catching with nets, one of which was to lie concealed on the hills in wait for the birds returning from the sea at nightfall, and as they approached heavy with food and flying low, to suddenly appear and raise the net: the startled bird darted upward and became enmeshed. The other method was used for plover when resting on rocks inside the coral reef. The hunter chose a dark night and waded at high tide to one of the uncovered rocks. The net was wetted and silently shaken over the sleeping birds, which, waking and expecting rain, crowded closer together and slept again. The shower was repeated several times and the hunter, then sure of his quarry, threw the net over the group and held down the edges close to the rock with his hands and feet. When the birds were exhausted with their struggling, the net was gathered together with the booty inside.

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[51] Ibid, pl. ix, middle of upper figure.

[52] Two old Hawaiian ladies who had been continually at court during the reigns of several monarchs were shown this malo, and both independently affirmed that it was the malo of Liloa. The story of Liloa and his son Umi has been told too many times to repeat here. Liloa reigned on Hawaii at the latter part of the fifteenth century. It is possible that oloná fibre may outlast the intervening period, and, as the malo constituted the most important part of Umi's family credentials, the succeeding ruling chiefs would have preserved it with reverential care. There are several faint stains on the netting, but whether blood stains or not it is impossible to tell.

[53] B. P. B. Museum Memoirs, vol. i, no. 1, p. 13.

Fish Nets.—Upena, or fish nets and methods of using them have been described with considerable detail in Mrs. Beckley's[54] concise and complete article on Hawaiian fisheries, and Mr. Cobb's[55] comprehensive work on the commercial fisheries of these islands, in which is incorporated that of Mrs. Beckley. It will therefore not be necessary to do more than mention the nets of only Hawaiian origin, and describe and list such as are in the Museum.

The netting tools and the sizes of the mesh have been mentioned above. The material used was oloná, with rare exceptions. There is an upena ahuulu in the collection, No. 764, with unusually thick closely spun cord, which on examination proved to be waoke. In this example—a small hand net—it is probable that some cord prepared for koko was substituted during a scarcity of oloná. The other materials were hau, coir and ahuawa. For the shark net, upena mano, hau bark was stripped from the tree and while fresh was roughly twisted into thick rope. Hau and ahuawa were used for the rough turtle net—upena honu. Coir netting is said to have been used to lie in the water, as a protection against sharks, a few feet outside an oloná net in which captured fish were awaiting landing. Fishermen declare that sharks dislike the roughness of an article manufactured of coir. Another fisherman stated that the Hawaiian nets were not of coir, and that the use of such material was due to the Gilbert Islanders, of whom there was a large colony here for a generation up to a few years ago. Taking into consideration the abundance of oloná in this place and its flexibility, and the small size and scarcity of coconuts in these islands, it would seem natural that of the two the natives would turn to oloná as the staple. A number of the Museum nets have been tanned, the process merely requiring the steeping of the net and fresh bark of the *kukui* (*Aleurites triloba*) in water for several days.

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[54] Emma Metcalf Beckley. Hawaiian Fisheries and Methods of Fishing. Honolulu, 1883.

[55] John N. Cobb. Commercial Fisheries of the Hawaiian Islands, U. S. Fish Commission Report for 1901. Washington, 1902. It might be mentioned that in Mr. Cobb's excellent report are a number of sketches of fishing implements in this Museum, the acknowledgment of which has undoubtedly been overlooked by that gentleman.

Fish nets are frequently composed of two or more pieces of netting run together with a cord. Five methods of making this joining were noticed, the simplest being with a cord, called *aea*, drawn through the meshes of the two edges in turn. The second was by placing the meshes of the two edges exactly opposite and with a single cord tying them together in order, using a single knot. The third was to lay the edges together with the meshes alternating and then running the cord from one side to the other with a single knot at every mesh; this at first glance has the appearance of continuous netting. The fourth method of joining was to net on one edge and run the shuttle in turn through the loops of the other edge. The fifth was by joining the two edges by the usual form of netting. A number of the smaller nets, particularly those of small meshes seem to have been cut down or made of pieces taken from larger nets; in such cases the netted knot forming the edge seems to have stood the usual wear and tear. When a net has been torn or broken, more generally with the fine meshed nets, the mending was sometimes effected with an aea, or a piece was cut from an old net, laid over the hole and sewed on by the same method. Large nets are sometimes fastened together by a rope called *kukai*.

The name alihi was applied to the head and foot ropes, the full names being respectively alihi *pikoi* and alihi *pohaku*, or more recently alihi *kepau*. The pikoi was a float of wood, hau preferably, but failing that, kukui. Wiliwili (*Erythrina monosperma*), the lightest wood in the islands, was not considered sufficiently durable. In recent times two other woods have become available for the pikoi, and since their introduction oleander (*Nerium oleander*) and the castor oil tree (*Ricinus communis*) have been added to the list. The shape of the pikoi varied. In some, a large branch was cut into sections and the pieces split, and from these the pikoi was made (a block about 4 inches long, 3 inches wide and 1 inch thick). It was fastened through holes drilled in its side to the alihi. Another form was a section of a branch about 4 inches long, and 2.7 inches in diameter, which was pieced on the side and so attached. The heart wood in the kinds used was soft, and could be easily removed to allow the pikoi strung on the alihi, but it is uncertain if this kind of pikoi was of ancient use. Sinkers of pohaku (stone) and kepau (lead) were shaped to suit. Sticks used to support or distend a net were called *kuku*, and when curved or bent were also called *kaka*. To make the necessary length for the kuku or kaka two or more sticks were fastened together by overlapping and binding the ends. In referring to the nets by their native names, it should be mentioned that one form of fish net is occasionally used for various kinds of fishing and has a different name in each, and that the same name is sometimes applied to different nets in various parts of the islands.

UPENA PAPAI, CRAB NET.—One specimen, No. 762. This is a flat, circular sieve from 20 to 23 inches in diameter. The frame is composed of two kaka securely fastened. Stretched across the hoop is a set of parallel heavy cords one inch apart, at right angles to which is a second set the same distance apart and merely knotted to the first. This sieve of course cannot be called netting. Such an implement was mainly useful in throwing the crabs ashore after they had been enticed within range by a piece of bait. Fishermen report another style of upena papai, illustrated by Mr. Cobb,[56] in which the cords of the sieve give place to a conical net.

UPENA PAOO, OR UPENA IAO.—One specimen, No. 761. A small, fine-meshed, tanned dip net suspended from an ovate-acuminate frame, which shape is called *poo*. The frame is rigid and is composed of kaka bent until the ends meet at the point, where they are bound together and form the handle. A cross piece is tied to the frame seven inches from the handle. The net tapers irregularly to a point, which is directly below the handle. The mesh varies somewhat; adjoining the frame is a band of netting 4.5 inches wide of .75 inch mesh joined at the handle. Then come several rectangular pieces of nae averaging .2 inches in mesh. All the connections are with aea. These pieces have no selvage, and have probably been cut from the remains of a larger net. Length and breadth of frame, 32 and 17 inches. Depth of net 23 inches.

UPENA KAEE, OR KAEE PAOO.—One specimen, No. 765. The name is practically the same as that previously mentioned. The specimen is a small fine-meshed untanned scoop net with a frame similar to but longer and narrower than No. 761 and without cross piece. The kaka are two long pliant wands, resembling willow, twisted together. The frame is so pliant that it may be readily elongated by a little pressure at the handle and the opening thereby reduced in size. The net is shaped like a very broad sack, and is gathered very much at the upper margin. In this specimen the netting has been done for the purpose. The mesh of the top row is 1 inch, and has been reduced from .4 inch in the second row to .2 inch at the bottom. As netted, it was long and narrow, and to reach its present form, was doubled and netted together at the bottom and one side. Length and breadth of frame 27 and 9 inches. Length of net at bottom, 47 inches, depth 10 inches.

UPENA AHUULU, OR UPENA PUNI.—Two specimens, Nos. 763 and 764. In this style of net the kaka are two parallel sticks about 3.5 feet long. The net, of medium sized mesh, is a single piece of netting folded together and sewed at the bottom and side by the second or third method mentioned above. The top edges of the bag thus formed are attached one to each of the kaka for about three-fourths the length, the balance of the kaka remaining bare for handles. Where the two sides of the bag meet the kaka, the latter are fastened and prevented from spreading by cords about two inches long. The kaka are of about equal strength, and by holding the points of the handles in the palm of the hand and springing the sticks apart with the fingers, the kaka, being tied at the other end, become bowed and so open the mouth of the net wider when necessary. No. 763 is of oloná, and No. 764 of waoke, both tanned. The measurements are:—

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[56] Ibid, pl. 23.

763. Length of kaka 42 in., width apart 2–2.3 in.; length of net 33 in. or 25 meshes, depth 16 meshes, mesh 1.4 in.

764. Length of kaka 44 in., width apart 2.–2.5 in.; length of net 36 in. or 16 1-2 meshes, depth 8 1-2 meshes, mesh 2 in.

UPENA HOLOHOLO, OR UPENA POO.—One specimen, No. 5176. A large tanned dip net with a frame the same shape as No. 761, but three times as long and twice as broad. The cross piece is 16 inches from the point. The net has a mesh of 2 inches, and is composed of a piece of netting folded together and netted along the sides to form a bag. The net is suspended from the frame as far as the cross piece, the balance of the kaka being left uncovered for the handle. Length of frame 8.3 feet, width 2.8 feet. Length of net, 81 meshes, depth 24 meshes.

UPENA UHU.—Four specimens, Nos. 766, 767, 768 and 5175. These specimens are each composed of a square piece of netting stretched flat by alihi, which are fastened by the corners to the ends of two kaka tied at right angles to each other at the middle. The diagonal of the netting is less than the length of the kaka, so that the latter are somewhat arched when in position. Weights of stone, or lead, are fastened to the ends of each kaka. Specimen No. 766 is labelled *upena akiikii*, and has a mesh considerably smaller than the other nets of this kind. *Upena pakiikii* is probably the same.

766. Upena akiikii, length of kaka 6.5 ft., size of net 21×22 1-2 meshes, mesh 2.3 in.
767. Upena uhu, length of kaka 8.3 ft., size of net 10 1-2×18 meshes, mesh 6 in.
768. Upena uhu, length of kaka 8.5 ft., size of net 16×17 1-2 meshes, mesh 5.3 in.
5175. Upena uhu, without kaka, size of net 15×15 meshes, mesh 4.5 in.

Mr. Cobb's description[57] of an upena uhu does not seem to agree with the specimens in the Museum, nor with the evidence of fishermen consulted. The piece of netting is hardly bagged at all, and is almost as flat as a piece of netting can be in horizontal suspension. The kaka, which Mr. Cobb states were made "to swing around and lie parallel" and thereby close the mouth of the net to retain the fish, are fixtures when the implement is set up and cannot be moved from their relative position without drawing the net to the surface where the hand can reach and untie them. In drawing the implement rapidly through the water the net would of course act as a drag and bow the kaka somewhat, and bag the net, but the sticks are too stiff to bend much. The secret in catching the uhu, as described to the writer, is the knowledge that the instinct of the fish when disturbed is to dart to the bottom, and the uhu after being enticed into the net by the decoy spends its time in trying to swim through the meshes underneath. But one fish is caught with each dipping of this net.

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[57] Ibid.

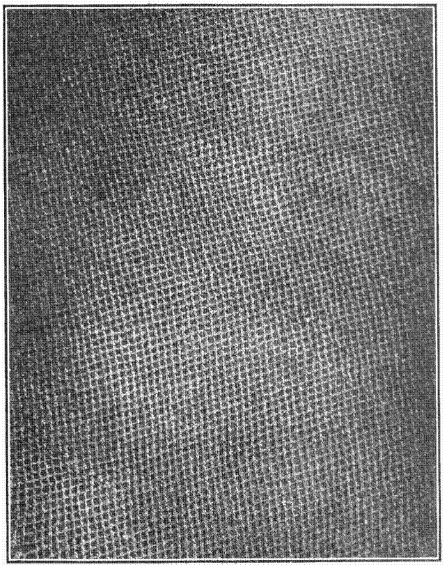

FIG. 164. SAMPLE OF .4 INCH MESH.

The scoop net described by Mr. Cobb on page 407[58] is known to the natives as *kaee*. There is a scoop net in the collections, No. 9052, without name or history, which from its appearance might well be used as a kaee also. It has a frame composed of two kuku 3.7 feet long, forked at one end; at the forked end they lie 2.3 feet apart, and come together at the others for the handle. Near the handle is a cross piece 8 inches long. Resting in the two forks is a kaka 6 feet long made by joining two slight wands. The net, .8 inch mesh, was a piece 51 meshes deep and 153 wide, and this has been sewed at the bottom and side by aea, making a bag 76 meshes wide. The top edge of the bag is fastened to the kaka which is somewhat bowed by the tension. About the middle of the two kuku, the sides of the bag are tied to the sticks and from the bottom of the bag is a cord reaching to the end of the handles. This net in position lies on the kuku with a wide mouth on the ground held wide open by the kaka which is bent around in a semicircle. Behind the mouth and sloping up towards the hand is the bag.

UPENA NAE KUKU.—Three specimens, Nos. 756, 757 and 6578, untanned. This is a scoop or bag net, of very fine mesh as indicated by the name. It is shaped like a sack, broader than long, with the end and top open, and gathered at the upper edges. Along part of these edges, Fig. 165, two kuku are tied, with their ends resting in rings at the corners. In operation these ends are placed on the sea bottom as far apart as the mouth of the net will allow and the sticks elevated at an angle of about 45°. The closed end of the bag drops behind like a pocket. These nets are composed of several pieces joined by aea and growing finer in mesh towards the pocket. In the figure is given a plan of No. 6578 showing the meshes and sizes of the various pieces. This specimen is called upena nae hinana, or upena hinana and is of particularly fine mesh. Fig. 164 shows a sample of .4 inch mesh in No. 757. The twine in these nets is much heavier than might be expected in those of such close mesh.

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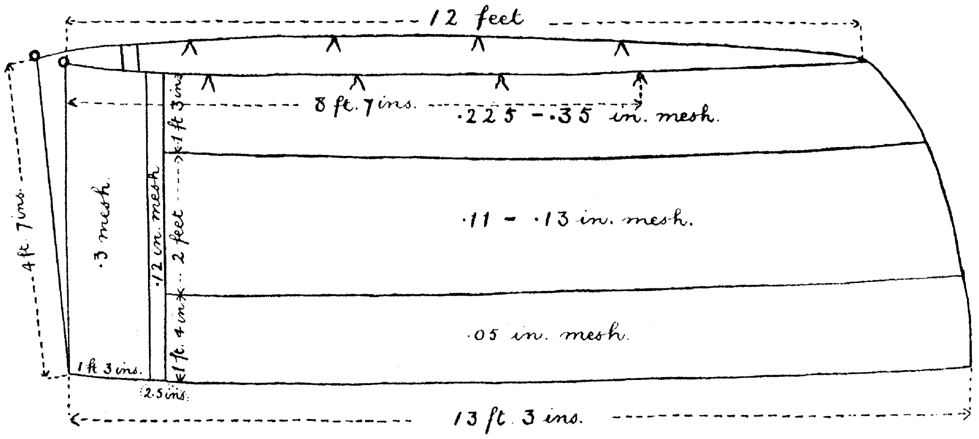
[58] Ibid.

756. Total length 7.5 ft., depth 4 ft., mesh .25-.4 in., length of kuku 4 ft.
757. Total length 25 ft., depth 7 ft., mesh .3-.5 in., length of kuku 17.5 ft.
6578. Total length 13.3 ft., depth 4.6 ft., mesh .05-.35 in., length of kuku 8.6 ft.

It is probable that the nets described as *upena nehu*, *upena pua*, *kapuni nehu* and *upena iiao* by Mrs. Beckley and Mr. Cobb would all come under the above description.

UPENA KAILI, OR UPENA AAI-OPELU.—One specimen, No. 760. This is a large semiglobular bag net suspended from two kaka. In position the ends of the kaka are overlapped and tied, making a circular opening. The length of the kaka is the same as that of the fishing canoe. Three men handle the net, one to draw the net to the surface, and one at each end of the canoe to untie the ends of the kaka and allow the sticks to spring to. The bottom of the net opens into a small bag, to which is fastened the stone sinker. In the specimen the kaka are wanting. This specimen was made of many pieces of netting of various meshes. On the top is a narrow band 7 meshes wide of 2.5 inch mesh. Then follows a band of 35 meshes wide and 2 inch mesh. The rest of the netting is 1.2 inches mesh, and, with the exception of the bag at the bottom, was made in two vertical sections. Each section was made up of strips of netting drooping at the middle, gathered at the upper edge and joined at the ends to the netting of 2 inch mesh. By this means the native secured the oval shape. Where portions of the ends overlapped, the larger sized net was cut and the piece fitted. The strips and sections were run together by aea. To attach the bag, the two bottom strips were cut in the middle of the lower edge and the bag fastened by the same cord as before. The bag was a broad piece of netting, netted at the sides, with an open bottom which was closed when fishing by tying with cord. It might be mentioned that the bag is 105 meshes round, while the opening in the bottom of the larger net is only 76 meshes in circumference. This specimen is 48 feet in circumference at the top; the depth, hanging flat, is 19.5 feet and that of the bag 2.9 feet. *Upena kaihi* is said to be similar to this net.

UPENA EKE.—One specimen, No. 5310. This specimen is an old untanned bag net, of which most of the bottom is missing. When in operation it is a long horizontal bag, tapering but slightly away from the mouth, which is at one end. At the other end in the specimen is an opening less than half the size of the mouth, where probably was fastened a closed bag of smaller size. In section, the bag is semicircular, with the arc above. The bottom part of the net called *honua* is anchored by stones at the corners of the mouth and at two points along each side about ten and twenty feet from the mouth. Between these points, stretching the honua wide are sticks called *puhi*. There is another stone at the tail end of the bag. To the upper curved part, called *lana*, the pikoi are fastened in great numbers in irregular rows. Heavy ropes of hau run the whole length of the bag, one along each edge and one on each slope of the lana about 8 feet from the edge. The total length of the lana is 39 feet, the first 21 feet from the mouth being light cord of .08 inch in thickness and of 1.5 inches mesh, and the rest of heavy cord .17 inch thick and 1.2–1.4 inches mesh. The lana is 29 feet in width at the mouth, measuring the ropes, and the lighter portion is made up of five pieces of wide netting averaging 33 meshes long and decreasing from 407 meshes wide in the first piece at the mouth to 238 meshes in the fifth. The pieces are run together by aea, in this net called *iwi puhi*. This method of tapering a net seems to have been preferred by natives to the use of the knot known as makakukai, already mentioned. The heavier part of the lana is in two pieces, 112 and 70 meshes long, and respectively 170 and 165 meshes wide. Of the honua, there remains but one piece, of the heavier cord, at the rear end. It is about 11 feet or 113 meshes long and 130 meshes wide. Leading away from the sides of the mouth, there should be two long nets called *paku*, the same depth as the bag, at a wide angle to each other, as a drive. The net on the right is said to be 15 fathoms long, and that on the left 10 fathoms. *Upena kolo* is said to be a net on the same lines as the preceding, but on a much larger scale. The same is reported of the net used in *Lau kapalili*. It is probable that the nets called *papahului* and *au-mai-ewa* and used in conjunction with each other are also similar.



NO. 165. DIAGRAM OF UPENA NAE KUKU.

HANO OHUA, OR UPENA OHUA.—One specimen, No. 7072. This specimen has been made of pieces of netting purchased from and netted by Chinese from Chinese fibre, and run together by natives by aea in what is probably one of their ancient forms of fish nets. The knot is what is known as the square or reef knot and is a poor one for fish nets. The mouth is semicircular, 11.8 feet at the base and 19.5 feet along the arc, and from there tapers to a small hole 2 inches in diameter. The length of the upper side is 11.8 feet, and of the lower 9 feet. The mesh is about .5 inch. The mouth is leaded at the bottom, and along the upper part is closely strung a row of pikoi. Fig. 166. *Hano iao* and *hano malolo* are reported as having this shape, the latter being a much larger net.

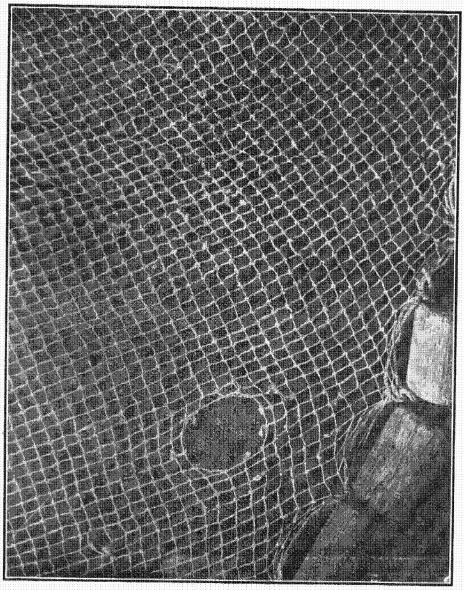


FIG. 166. HANO OHUA.

UPENA KUU, UPENA PALOA, or, generally speaking, seines or gill nets. Two specimens, Nos. 758 and 759, tanned.

758. Length 82 ft., depth 7 ft. or 41 meshes, mesh 2.2 in.
759. Length 66 ft., depth 10.5 or 48 meshes, mesh 3.3 in.

The names of some of the nets reported[59] under this heading are *akuikui* or *pakuikui*, *uluulu*, *kawaa*, *kupo*, *luelue*, *pahu*, *papaolewalewa*, *pouono*. Occasionally a kuku was fastened to each end of the net, and was of great assistance when drawing the net through the water.

UPENA MANO AND UPENA HONU.—Large meshed roughly made nets of about 12 or 6 in. mesh respectively. They are reported to be about 100 ft. long and 6 ft. deep.

There are several other names,[60] attributed to fish nets, for which the writer has been unable to find descriptions, viz.: *apai*, *uhina*, *kai*, *kaii*, *kuleohua*, *lualua*, *makui*. Some of these names no doubt refer to forms of the nets described above.

In concluding, the writer wishes to express his appreciation and thanks to Mr. L. G. Blackman for his careful and painstaking drawings, and to Dr. W. T. Brigham, Professor Otis T. Mason and many others for suggestions and information cheerfully given and the generous loan of specimens.

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[59] Hawaiian Antiquities, by David Malo, pp. 277, 279, 280, and Andrews' Hawaiian Dictionary.

[60] Ibid.

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